SIGNIFICANT ECOLOGICAL FEATURES INVENTORY OF THE LESSER SLAVE LAKE INTEGRATED RESOURCE PLANNING AREA

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TABLE OF CONTENTS

1.0 INTRODUCTION 1
  1.1 Background 1
  1.2 Study Objectives 3

2.0 STUDY AREA DESCRIPTION 5
  2.1 Location 5
  2.2 Climate 5
  2.3 Bedrock Geology 9
  2.4 Surficial Geology and Soils 10
  2.5 Vegetation and Ecological Zonation 13
    2.5.1 Mid Boreal Mixedwood Ecoregion (11) 13
    2.5.2. Lower Boreal-Cordilleran Ecoregion (9) 15
    2.5.3 Upper Boreal-Cordilleran Ecoregion (10) 16
    2.5.4 Ecodistricts 17
      2.5.4.1 Lesser Slave Lake Lowlands Ecodistrict (11LL) 18
      2.5.4.2 Peace Lowlands Ecodistrict (11PL) 18
      2.5.4.3 Pelican Mountains Ecodistrict (11PM) 18
      2.5.4.4 Wabasca Lowlands Ecodistrict (11WL) 19
      2.5.4.5 Athabasca River Valley Ecodistrict (11AV) 19
      2.5.4.6 Southern Alberta Uplands Ecodistrict (11SU) 19
      2.5.4.7 Southern Alberta Uplands Ecodistrict (10SU) 19
      2.5.3.8 Pelican Mountains Ecodistrict (9PM) 20
      2.5.3.9 Southern Alberta Uplands Ecodistrict (9SU) 20
  2.6 Wildlife 20
    2.6.1 Mammals 21
    2.6.2 Avifauna 22
  2.7 Fisheries 24
  2.8 Lake Basin Characteristics of Lesser Slave Lake 25

3.0 METHODS 27
  3.1 Evaluation of Significant Ecological Features 27
    3.1.1 Classification Criteria 27
    3.1.2 Levels of Significance 28
  3.2 Data Collection 30
    3.2.1 Aerial Photograph Interpretation 30
    3.2.2 Literature Review 31
    3.2.3 Interviews 32
    3.2.4 Field Reconnaissance 32
  3.3 Evaluation of Sensitivity of Significant Ecological Features 33
  3.4 Database Preparation 34
  3.5 Digital Map Production 37

4.0 INVENTORY OF SIGNIFICANT ECOLOGICAL FEATURES 38

5.0 SENSITIVITY OF SIGNIFICANT ECOLOGICAL FEATURES 44

6.0 MANAGEMENT CONSIDERATIONS 47
  6.1 Landform and Hydrological Features 47
    6.1.1 Soils and Landform 47
    6.1.2 Peatlands 49
    6.1.3 Hydrological Features 50
  6.2 Vegetation Features 51
    6.2.1 Rare Plants and Plant Communities 51
    6.2.2 Old-Growth Forests 54
  6.3 Wildlife and Fisheries 55
    6.3.1 Ungulates 55
    6.3.2 Furbearers and Small Mammals 57
    6.3.3 Avifauna 58
    6.3.4 Fisheries 60
  6.4 Scientific and Cultural Features 62
    6.4.1 Natural Areas 62
    6.4.2 Historic Sites 63

7.0 DATA GAPS 66

8.0 CHECKLISTS OF SIGNIFICANT ECOLOGICAL FEATURES 68

9.0 LITERATURE CITED 122

APPENDIX 1. SUMMARY OF COMMERCIAL FISHING HARVESTS FOR LESSER SLAVE LAKE OVER LAST FIVE YEARS

APPENDIX 2. SIGNIFICANT ECOLOGICAL FEATURE DATABASE

LIST OF TABLES

Table 1. Summary of climate station data for the Lesser Slave Lake study area 8

Table 2. Summary of soil characteristics. 12

Table 3. Lake basin characteristics of Lesser Slave Lake 26

Table 4. Sensitivity of significant natural features to major types of land use activities. 46

LIST OF FIGURES

Figure 1. Study area location 6

Figure 2. Bedrock geology of the study area 11

Figure 3. Ecoregions and ecodistricts of the study area 14

1.0 INTRODUCTION

1.1 Background

Significant ecological features (SEF's) are important, unique and often sensitive features of the landscape. As an integral component of sustainable development strategies, they provide long-term benefits to society by maintaining ecological processes and by providing useful products. Large portions of many of Alberta's native habitats have already been altered or destroyed and land uses such as surface mining, oil and gas exploration, timber harvesting, agriculture and industrial and urban developments will continue to put pressure on native species and habitats. The identification and management of significant ecological features can be a valuable addition to the traditional socioeconomic factors which have been the driving force behind land use planning in the past.

The identification and description of significant ecological features and environmentally significant areas through inventories such as that carried out in this study, forms one of the implementation strategies critical to the establishment of a network of protected areas throughout the province. The *"Special Places 2000"* Program has been established by the Alberta government to provide direction for the identification and establishment of protected areas. Protected areas are special places that are explicitly legislated and managed to protect Alberta's natural heritage (Alberta Tourism, Parks and Recreation 1992). *"Special Places 2000"* will build on past accomplishments in Alberta using a variety of designations including national and provincial parks, wilderness areas, ecological reserves and natural areas to complete a comprehensive network of protected areas throughout the province. Significant ecological feature inventories serve as a valuable source of information for future protected area selection and designation.

Much of the early work in Canada on the development of criteria for identifying significant ecological features (SEFs) and landscapes and environmentally significant areas (ESAs) occurred as a result of studies undertaken for various regional governments in southern Ontario by the

Centre for Resources Development at the University of Guelph during the 1970s. Eagles (1980, 1984) updated and further developed much of this work and documented various identification criteria. These criteria deal principally with the identification of areas that represent unique, unusual or remnant ecosystems, unique landforms, habitat for rare and endangered species, areas of unusually high biological diversity, areas that perform a vital ecological function and areas with significant scientific or educational potential. Studies by Eagles have formed the basis for criteria used in ESA and SEF studies in various jurisdictions in Alberta including the City of Edmonton (O'Leary et al. 1993), the City of Calgary (Lamoureax et al. 1983), Eastern Boreal Forest Region of Alberta (D.A.Westworth and Associates Ltd 1990), M.D. of Sturgeon (Westworth and Knapik 1987), County of Leduc (Brusnyk et al 1990) and various ESA studies within the Oldman, Red Deer, Palliser and Southeast Alberta Regional Planning Commissions by Cottonwood and Sweetgrass Consultants.

In the Lesser Slave Lake area, information on significant ecological features is required by the integrated resource planning team to assist in making land use decisions for the future. As well as providing information to the planning team, these types of inventories have other functions, including the identification of:

1. Gene pools for future use, including reclamation of disturbed lands, breeding of genes into commercial species or development of new commercial products such as antibiotics.
2. Rare of endangered species and their habitats.
3. Travel corridors and resting places for migratory species.
4. Mature, stable climax ecosystems with their constituent complete ecological complexity.
5. Benchmarks against which man-altered areas can be compared.
6. Large blocks of habitat for species that require extensive areas for breeding and survival.
7. Representative samples of different plant and animal habitats characteristic of each ecoregion.
8. Habitat for fish and wildlife and plant species that require undisturbed natural areas.
9. Research areas for earth and life science studies.
10. Sources of groundwater recharge, low stream flow supplementation, flood peak reduction

and headwater protection for hydrological systems.

11. Filtration and cleaning of air and water flows.
12. Sensitive soils that may require protection from erosion.
13. Significant geological features.
14. Lands with severe development constraints such as those on floodplains, steep and unstable slopes, or permanent wetlands.
15. Areas for public education of resources and their management.
16. Aesthetically pleasing environments.
17. Potential commercial services such as outdoor recreation.

This report presents the results of a study initiated by Alberta Environmental Protection to identify significant ecological features within the Lesser Slave Lake Subregional Integrated Resource Planning Area. The study represents an attempt to document and describe the significant ecological and biophysical features of the planning area and to suggest strategies for their conservation and management. The study was conducted by GEOWEST Environmental Consultants Ltd. under the direction of staff from the Resource Information Division of Alberta Environmental Protection with assistance from planning team members and the Resource Planning Branch.

1.2 Study Objectives

The overall objective of the project was to inventory, classify, describe and map significant ecological features in the Lesser Slave Lake study area. Specific objectives of the study were:

1. To conduct an inventory of significant ecological features in the Lesser Slave Lake Integrated Resource Planning Area in the context of international, national, provincial, regional and local significance at a scale of 1:100,000.

2. To evaluate the relative sensitivity of sites classed as significant in the study area.

3. To suggest management considerations appropriate for each site.

4. To provide a digital database for significant ecological features.

5. To produce digital thematic maps of significant ecological features.

2.0 STUDY AREA DESCRIPTION

2.1 Location

The Lesser Slave Lake planning area (Figure 1) is located in north-central Alberta approximately 230 km (143 mi) northwest of Edmonton. The boundary of the planning area includes the area north from the Lesser Slave Lake shoreline to the 20th Base Line. This portion of the planning area is bounded by Hilliard's Bay Provincial Park on the west and the Wabasca Integrated Resource planning area boundary to the east. A southeastern extension of the main planning area includes the Town of Slave Lake, the Lesser Slave Lake Provincial Park, and the Lesser Slave River which drains Lesser Slave Lake to the east. This extension abuts the boundaries of several Integrated Resource Planning areas: Big Bend to the east, the North Swan Hills to the south. The south shore of Lesser Slave Lake is included in the Frost Hills Local Integrated Resource Plan. The Lesser Slave Lake planning area covers approximately 3235 km^2 (1249 sq. mi).

Year-round access is provided to the eastern periphery of the north shore including the town of Slave Lake and Lesser Slave Lake Provincial Park by primary hard surface Highway No.2. The Lesser Slave River can be accessed at numerous points from the all-season Highway No.2A which parallels the river from the town of Slave Lake to Smith. The western edge of the north shore and Hilliard's Bay Provincial Park is serviced by all season Highway No.750 from the Town of High Prairie. Highway No. 88 runs north-south through the study area from Slave Lake through Lesser Slave Lake Provincial Park. Highway No. 754 branches off to the east, north of the park, and provides access to Wabasca.

2.2 Climate

The only long-term, year-round meteorological station within the study area occurs at the Slave Lake Airport. However, climate data for the summer months is available from a number of Alberta Forest Service lookout towers located within the study area. Temperature and

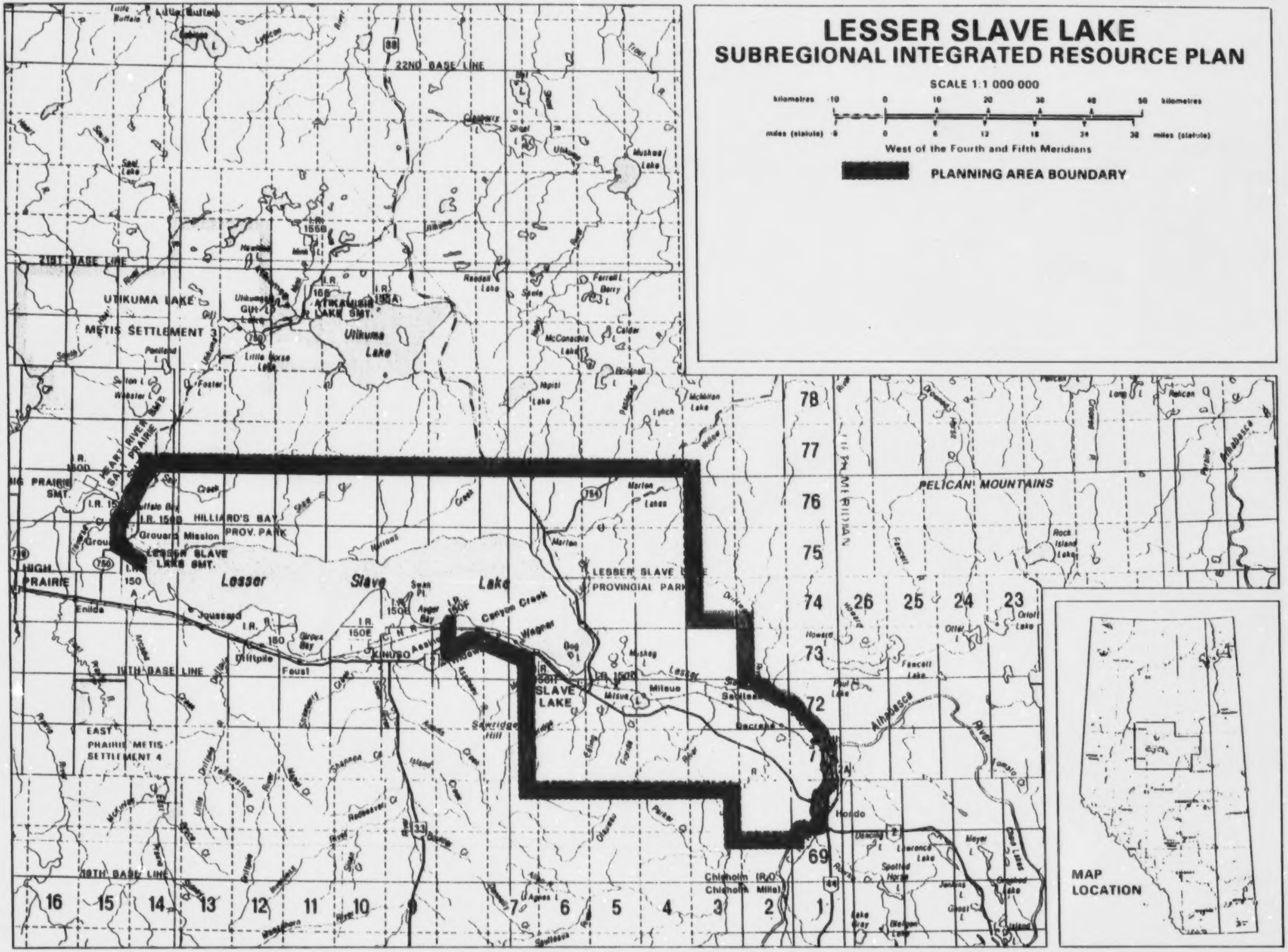
LESSER SLAVE LAKE
SUBREGIONAL INTEGRATED RESOURCE PLAN
SCALE 1:1 000 000
kilometres
miles (statute)
West of the Fourth and Fifth Meridians
PLANNING AREA BOUNDARY
MAP LOCATION
22ND BASE LINE
21ST BASE LINE
19TH BASE LINE
18TH BASE LINE
UTIKUMA LAKE METIS SETTLEMENT 3
Utikuma Lake
ATIKAMEG LAKE SMT.
PELICAN MOUNTAINS
FIFTH MERIDIAN
HILLIARD'S BAY PROV. PARK
Grouard Mission
LESSER SLAVE LAKE SMT.
HIGH PRAIRIE
Enilda
Joussard
Faust
Driftpile
KINUSO
Lesser Slave Lake
Canyon Creek
LESSER SLAVE LAKE PROVINCIAL PARK
SLAVE LAKE
Mitsue
Sawridge Hill
Hondo
Chisholm
Chisholm Mills
EAST PRAIRIE METIS SETTLEMENT 4
Athabasca River
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Figure 1 Regional Location

precipitation data from these stations are summarized in Table 1.

The study area is located in the Boreal Ecoprovince (Strong 1992), characterized by short, cool summers and long, cold winters and relatively low annual precipitation. Insolation and circulation patterns are the principal climatic controls. Net energy inputs are low because of the northern latitude of the area. Arctic air masses with low moisture content are dominant in winter and spring, while summer and fall are dominated by warmer, wetter westerly air masses that arise from the Pacific.

The study area is included in three ecoregions - the Mid Boreal Mixedwood, Upper Boreal-Cordilleran and Lower Boreal-Cordilleran - each of which have somewhat different climatic characteristics (Strong 1992). The Mid Boreal Mixedwood Ecoregion is characterized by a mean annual precipitation total of 397 mm, with only an average of 64 mm occurring in the winter. Mean temperature during the summer is 13.5°C, while in the winter it is -13.2°C. Mean Growing Degree Days are 1143, as compared to 1008 and 752 in the Upper Boreal-Cordilleran and Lower Boreal-Cordilleran respectively (Strong 1992).

The Lower Boreal-Cordilleran occupies mid-elevation areas in the study area. The climate of this ecoregion is continental, with a large range between summer and winter temperatures and higher summer rather than winter precipitation. Summer precipitation represents approximately two-thirds of the total yearly precipitation for the ecoregion (Strong 1992). May through August precipitation total for the one station within the study area is 399.3 mm (Table 1), as compared to a summer median of 295 mm for the entire ecoregion. Summer temperatures for this ecoregion are somewhat higher than for the Upper Boreal-Cordilleran Ecoregion as shown in Table 1. Growing degree days average 1008 for the ecoregion and potential evapotranspiration deficits are near zero during summer months because of cooler temperatures and relatively high precipitation (Strong 1992). Winter temperatures are somewhat warmer and snow depths likely greater than for the Mid Boreal Mixedwood Ecoregion because of the Cordilleran climatic influence.

Table 1. Summary of climate station data for the Lesser Slave Lake study area[1]

Station	Ecoregion	Lat. N	Long. W	Elev. (m)	Annual Precip. (mm)	Precip. May-Aug. (mm)	Degree Days Above 5°C (May-Aug)	Mean Temp. May-Aug (°C)	Mean Temp. Jan (°C)
Slave Lake A	11	55° 18′	114° 47′	581	496.0	296.3	1030.0	13.30	-14.6
Smith RS	11	55° 10′	114° 02′	564	-	298.9	1010.2	13.15	-
Marten Mtn. LO	9	55° 30′	114° 42′	1021	-	394.3	876.8	12.00	-
Flat Top LO	10	55° 09′	114° 48′	1030	-	384.5	915.0	12.25	-
Salt Prairie LO	11	55° 40′	115° 50′	716	-	315.6	987.2	12.98	-
Edmonton Int'l A[2]	4	53° 18′	113° 35′	715	465.8	289.4	1096.4	13.86	-14.2

[1] Canadian Climate Normals 1961 - 1990, Environment Canada, Atmospheric Environment Service

[2] Included for comparison purposes

The Upper Boreal-Cordilleran Ecoregion occurs in the highest elevations of the study area such as the Flat Top area of the northern Swan Hills. The Cordilleran influence is expressed by somewhat lower winter temperatures and cooler summer temperatures as compared to other boreal ecoregions. The mean May through August daily temperature is 12.25°C for the Flat Top climate station in the study area (Table 1), while the mean for the ecoregion is 11.5°C. This ecoregion has more days of precipitation during the summer than any ecoregion in the province (Strong 1992). As shown in Table 1, Flat Top Lookout has 384.5 mm of precipitation from May through August, as compared to 289.4 mm at the Edmonton International Airport.

2.3 Bedrock Geology

Bedrock geology of the Lesser Slave Lake study area has been mapped at 1:1,500,000 (Green et al. 1970). It consists of Upper Cretaceous formations, primarily marine shales of the Smoky Group and non-marine sandstones, shales and coal beds of the Wapiti formation. Four formations are predominant in the study area and are as follows:

- Smoky Group (corresponds to Puskwaskau, Bad Heart and Kaskapau formations) - dark grey shales and silty shales, nodules and their beds of concretionary ironstone; non marine.

- Wapiti Formation - grey feldspathic, clayey sandstone; grey bentonitic mudstone and bentonite; scattered coal beds; non-marine.

- Upper Colorado Group - Lea Park Formation - shale; glauconitic silty shale with ironstone concretions; marine.

- Lac La Biche Formation (corresponds to Dunvegan and Shaftbury Formations) - dark grey shales and silty shales; ironstone partings and concretions; silty fish-scale bearing beds in lower part; marine.

The distribution of these formations is mapped in Figure 2.

Two major preglacial drainage systems occur in the study area. These are deeply cut into Cretaceous shales and contain basal and near basal sands and gravels. The two systems are as follows:

- High Prairie buried valley system - enters map sheet 83 0 southwest of Smith and drains west under Lesser Slave Lake to High Prairie; drift cover is 76-152 m

- Atikameg buried valley system - the main tributary of the buried Misaw valley draining northwest and north through the Red Earth area; begins near Gift Lake and drains east to Utikuma Lake and northwest to the Muskwa River, where it joins the buried Misaw valley system; drift cover is 76- 229 m

All present-day drainage follows the same flow directions as the preglacial drainage systems except for the High Prairie system in which blockage of this channel during glaciation and deglaciation by till, alluvial and lacustrine deposits resulted in reversal of drainage from Lesser Slave Lake to the Athabasca River.

2.4 Surficial Geology and Soils

The interaction of regional and local climate, landform and biota over time have produced a variety of soil types in the study area. A soil study was conducted in the area by Lindsay (1962). Table 2 presents a summary of general soil characteristics by ecodistrict.

Raised beach deposits are common along the north slope of Lesser Slave Lake indicating former lake beds up to 700 masl (2300 ft) or about 122 m (400 ft) above the present-day level. At this level only portions of the Marten Hills would be free of glaciolacustrine deposits.

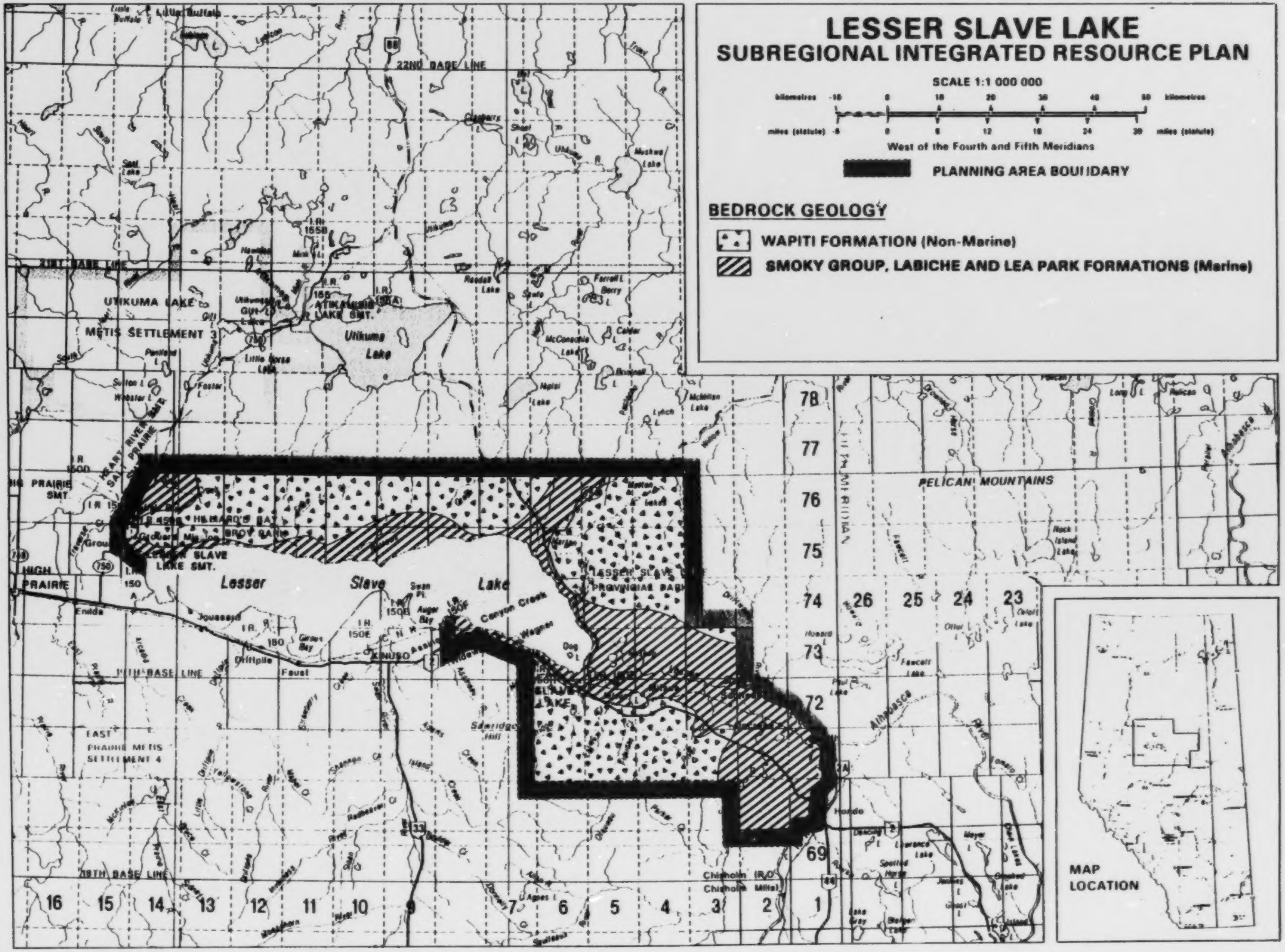
LESSER SLAVE LAKE
SUBREGIONAL INTEGRATED RESOURCE PLAN
SCALE 1:1 000 000
kilometres -10 0 10 20 30 40 50 kilometres
miles (statute) -6 0 6 12 18 24 30 miles (statute)
West of the Fourth and Fifth Meridians
PLANNING AREA BOUNDARY
BEDROCK GEOLOGY
WAPITI FORMATION (Non-Marine)
SMOKY GROUP, LABICHE AND LEA PARK FORMATIONS (Marine)
MAP LOCATION
22ND BASE LINE
21ST BASE LINE
20TH BASE LINE
19TH BASE LINE
FIFTH MERIDIAN
PELICAN MOUNTAINS
UTIKUMA LAKE
METIS SETTLEMENT 3
Utikuma Lake
ATIKAMEG LAKE SMT.
HIGH PRAIRIE
BIG PRAIRIE SMT.
LESSER SLAVE LAKE SMT.
Lesser Slave Lake
LESSER SLAVE PROVINCIAL PARK
SLAVE LAKE
KINUSO
Canyon Creek
Joussard
Faust
Driftpile
Enilda
EAST PRAIRIE METIS SETTLEMENT 4
Chisholm
Chisholm Mills
Hondo
Athabasca River
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Figure 2 Bedrock Geology

Table 2. Summary of soil characteristics.

Ecodistrict	Soils
Lesser Slave Lake Lowlands (11LL)	Eutric Brunisols - alluvial and aeolian sand and gravel outwash; significant organic deposits.
Peace Lowlands (11PL)	Gray Luvisols - sandy loams; glacial till, bog and glaciofluvial outwash; extensive organic deposits.
Pelican Mountain (9PM, 11PM)	Gray Luvisols and Brunisols - sandy loam and clay loam; glacial till and outwash materials with occasional organic deposits.
Wabasca Lowlands (11WL)	Gray Luvisols - sandy loam, loamy sand; glacial till and outwash materials with small organic deposits.
Athabasca River Valley (11AV)	Orthic and Cumulic Regosols - sand and loamy sand; undifferentiated materials.
Southern Alberta Uplands (9SU, 10SU, 11SU)	Gray Luvisols and Dystric Brunisols - sandy loam; gravels, glacial till and outwash materials; tertiary gravels at higher elevations.

2.5 Vegetation and Ecological Zonation

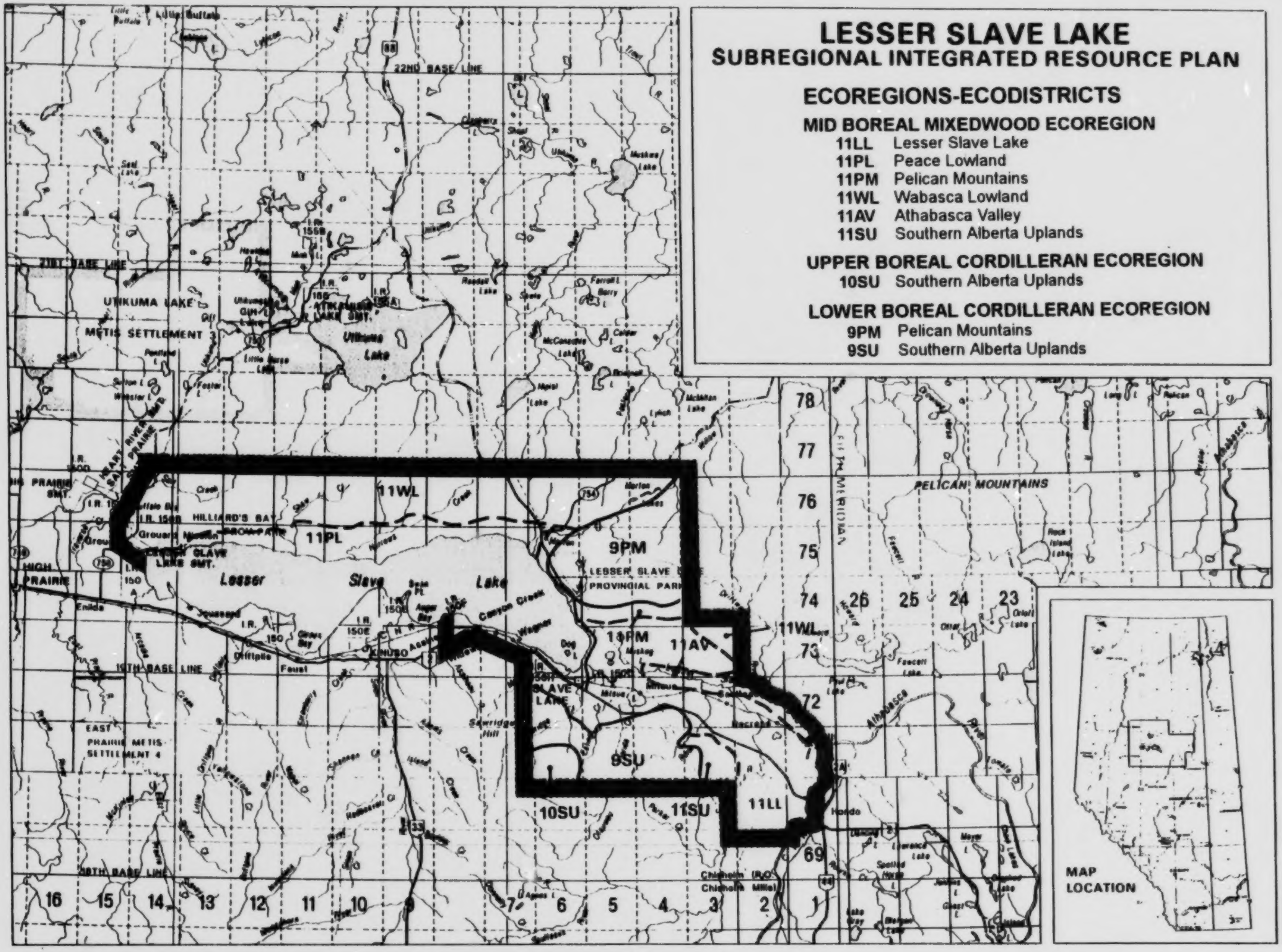
The interaction of regional climate and physiography in the Lesser Slave Lake study area has produced distinctive patterns of vegetation. These patterns are classifiable and mappable at a very broad scale (1:1,000,000) as ecoregions (Strong and Leggat 1992).

The Lesser Slave Lake study area is located within three ecoregions - the Mid Boreal Mixedwood Ecoregion, the Lower Boreal-Cordilleran Ecoregion and the Upper Boreal-Cordilleran Ecoregion. The boundaries of the ecological zones as they occur within the study area are illustrated in Figure 3. A brief description is provided below of each ecoregion and associated vegetation.

2.5.1 Mid Boreal Mixedwood Ecoregion (11)

The Mid Boreal Mixedwood Ecoregion is most similar to the moist subregion of the Boreal Mixedwood as described by Strong and Leggat (1981) and occupies most of the study area. The topography is largely subdued although several hill complexes and river valleys comprise significant landscape components.

Modal vegetation is dominated by aspen *(Populus tremuloides)* and balsam poplar *(Populus balsamifera)* stands with understories commonly composed of blue joint *(Calamagrostis canadensis)*, wild sarsaparilla *(Aralia nudicaulis)*, prickly rose *(Rosa acicularis)*, fireweed *(Epilobium angustifolium)*, bunchberry *(Cornus canadensis)* and dewberry *(Rubus pubescens)*. Subxeric sites are also dominated by aspen but green alder *(Alnus crispa)*, pin cherry *(Prunus pensylvanica)*, and prickly rose become more common in the understorey. White spruce *(Picea glauca)* and balsam fir *(Abies balsamifera)* are considered climax species but the occurrence of fire prevents them from being well represented in many areas. Sandy, rapidly to well drained sites generally support open jack pine *(Pinus banksiana)* or mixed jack pine-aspen-white birch stands. The understorey is typically an open mix of bearberry *(Arctostaphylos uva-ursi)* and


LESSER SLAVE LAKE
SUBREGIONAL INTEGRATED RESOURCE PLAN
ECOREGIONS-ECODISTRICTS
MID BOREAL MIXEDWOOD ECOREGION
11LL Lesser Slave Lake
11PL Peace Lowland
11PM Pelican Mountains
11WL Wabasca Lowland
11AV Athabasca Valley
11SU Southern Alberta Uplands
UPPER BOREAL CORDILLERAN ECOREGION
10SU Southern Alberta Uplands
LOWER BOREAL CORDILLERAN ECOREGION
9PM Pelican Mountains
9SU Southern Alberta Uplands
11WL
11PL
9PM
11PM
11AV
9SU
10SU
11SU
11LL
11WL
Lesser Slave Lake
LESSER SLAVE LAKE PROVINCIAL PARK
UTIKUMA LAKE
METIS SETTLEMENT
Utikuma Lake
22ND BASE LINE
21ST BASE LINE
10TH BASE LINE
9TH BASE LINE
HILLIARD'S BAY
HIGH PRAIRIE
SLAVE LAKE
KINUSO
EAST PRAIRIE METIS SETTLEMENT 4
PELICAN MOUNTAINS
FIFTH MERIDIAN
Athabasca River
Sawridge Hill
Hondo
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MAP LOCATION

Figure 3. Ecoregions-Ecodistricts

blueberries *(Vaccinium spp.)*

Dense black spruce *(Picea mariana)* stands occur on imperfectly to poorly drained areas with balsam poplar and white birch *(Betula papyrifera)* also present. The understorey of these areas is highly variable but Labrador tea *(Ledum groenlandicum)*, bog cranberry *(Vaccinium vitis-idaea)* and mosses become increasingly common in older stands. Sites with very high water tables, or those that are flooded for part of the growing season, typically have dense willow *(Salix spp)* or willow-swamp birch *(Betula pumila)* cover with sedges *(Carex spp)* dominating the understorey. Within the major water bodies, emergent vegetation such as bulrushes *(Scirpus spp)*, common cattail *(Typha latifolia)*, duckweed *(Lemna trisuka)*, stonewart *(Chara spp)*, coontail *(Ceratophyllum demersum)*, Richardson pondweed *(Potamoeton richardsonii)* and watermilfoil *(Myriophyllum exalbescens)* are common.

2.5.2. Lower Boreal-Cordilleran Ecoregion (9)

In general, this portion of the ecoregion that falls within the study area is comprised of undulating and rolling topography that is associated with the Southern Alberta Uplands in the southeast and the Pelican Mountains in the east (Strong 1992). The Lower Boreal-Cordilleran Ecoregion occurs approximately above the 700m contour level in the vicinity of Lesser Slave Lake.

The Lower Boreal-Cordilleran ecoregion is an ecotone between boreal and cordilleran climatic conditions, as well as between the deciduous boreal and coniferous cordilleran vegetation. The variety of species is highly dependent upon geographic location and site history. In general, the deciduous components are more prevalent at lower elevations. The occurrence of lodgepole pine *(Pinus contorta)* within deciduous forest stands may be partially explained by the moister summer and warmer winter conditions of the Lower Boreal-Cordilleran Ecoregion relative to the Boreal Mixedwood ecoregions. The understorey vegetation is commonly composed of hairy wild rye *(Elymus innovatus)*, fireweed, wintergreen *(Pyrola spp)*, composite species, and common Labrador tea. Secondary succession is to white spruce, although black spruce and balsam fir occur.

Rapidly to well drained sites and southerly aspects are usually dominated by stands of open-growing lodgepole pine with common bearberry, junipers, Canada buffaloberry *(Shepherdia canadensis)*, and scattered herbs. The dry site conditions result in poor vegetation growth and weakly developed Brunisolic soils.

Imperfectly drained sites are dominated by lodgepole pine that is invaded by black and white spruce. The understorey is dominated by feathermosses and common Labrador tea.

Black spruce and tamarack *(Larix laricina)* dominate poorly drained depressions. Organic deposits are common on the surface of these areas which results in the ground temperature being maintained near freezing until the end of May or later.

2.5.3 Upper Boreal-Cordilleran Ecoregion (10)

Within the study area, the Upper Boreal-Cordilleran Ecoregion occurs in a small area of high elevation terrain that is a part of the Swan Hills which are located primarily to the southwest of the study area. Strong (1992) included the Swan Hills as an outlier of this ecoregion, the main component of which occurs elevationally below the Subalpine Ecoregion along the east slopes of the Rocky Mountains.

This ecoregion has a boreal climate that is significantly influenced by cordilleran climatic patterns such as ameliorated winter temperatures and cooler summer temperatures (Strong 1992). The precipitation regime is still dominantly continental with proportionately more of the yearly precipitation occurring during the summer months. However, winter snowfall tends to be higher than other Boreal Mixedwood ecoregions (Strong 1992).

Within the study area, coniferous forest dominates the landscape, with the growth of deciduous tree species being restricted by the generally cooler climatic conditions. Lodgepole pine is the dominant tree species in early to mid successional conditions. Secondary succession is by white spruce, black spruce and balsam fir. Understorey vegetation is typically less diverse than in the Lower Boreal-Cordilleran, with typical species being Labrador tea, green alder (*Alnus crispa*), wintergreen (*Pyrola spp.*), twinflower (*Linnaea borealis*), bunchberry (*Cornus canadensis*) and various feathermosses. Old-growth spruce-fir stands at higher elevations often have species more generally associated with lower subalpine forests such as dwarf bramble (*Rubus pedatus), false azalea (Menziesia glabella),* white-flowered rhododendron *(Rhododendron ferruginea)* and *tall bilberry (Vaccinium membranaceum)* (Achuff and LaRoi 1977).

Imperfectly drained sites generally have a larger component of black spruce in association with lodgepole pine and a dense cover of Labrador tea, bog cranberry (*Vaccinium vitis-idaea*) and feathermosses. Black spruce dominates poorly drained sites.

2.5.4 Ecodistricts

Ecodistricts are the subdivisions of ecoregions based upon distinctive physiographic and/or geologic patterns (Subcommittee on Biological Land Classification 1969). The latest classification and mapping of ecodistricts at 1:1,000,000 scale (Strong 1992) was based primarily on a review and synthesis of the map entitled, Physiographic Subregions of Alberta (Pettapiece 1986). Distinctive differences in landscape patterns, major differences in relief, and broad areas of similar surficial material were the primary criteria used to recognize units. Many of the classification units that were eventually used as ecodistricts by Strong (1992) correspond to Pettapiece's physiographic regions which were originally modified from Bostock (1964).

As discussed above, three ecoregions, the Mid Boreal Mixedwood, Lower Boreal-Cordilleran and Upper Boreal-Cordilleran occur in the study area. Within these three ecoregions, nine ecodistricts occur and are described in more detail below and identified in Figure 3.

Within the Mid Boreal Mixedwood Ecoregion (11) are the Lesser Slave Lake Lowlands (11LL), Peace Lowlands (11PL), Pelican Mountains (11PM), Wabasca Lowlands (11WL), Athabasca River Valley (11AV) and Southern Alberta Uplands (11SU) ecodistricts. Within the Lower Boreal-Cordilleran Ecoregion are the Pelican Mountains (9PM) and Southern Alberta Uplands (9SU) ecodistricts. Within the Upper Boreal-Cordilleran Ecoregion (10) is the Southern Alberta Uplands Ecodistrict (10SU). A brief description of each of these ecodistricts is provided below.

2.5.4.1 Lesser Slave Lake Lowlands Ecodistrict (11LL)

This ecodistrict occupies the southeastern portion of the study area and occurs at elevation of 600 masl to 650 masl. It consists of an extensive area of glacial outwash located above and parallel to the Athabasca and lower Lesser Slave rivers (Strong 1992). The prominent features are Mitsue Lake, Lesser Slave and Athabasca rivers and two major tributaries which flow into the Lesser Slave River from the south, the Saulteaux and Otauwau rivers. The topography is variable with predominantly gentle to moderately inclined and undulating slopes. A complex of undulating fluvial, ridged eolian and organic material occurs through most of the ecodistrict.

2.5.4.2 Peace Lowlands Ecodistrict (11PL)

The Peace Lowland Ecodistrict is a low relief area that occurs immediately adjacent to the north shore of Lesser Slave Lake (Strong 1992) at elevations between 750 masl and 450 masl. The area is poorly drained and lacustrine deposits are common; outwash parent materials are prevalent with the main source being old fluvial deltas. Major creeks draining into Lesser Slave Lake within the study area are Shaw and Narrows Creeks along the north shore and Marten Creek at the eastern boundary. A small number of minor, slow, meandering drainages also enter from the north.

2.5.4.3 Pelican Mountains Ecodistrict (11PM)

The Pelican Mountains Ecodistrict consists of the undulating south-facing morainal slopes of the

Pelican Mountains and occurs at elevations from 600 masl to approximately 750 masl. Prominent features are the deeply incised drainages such as the Driftwood and Fawcett Rivers to the east of the study area.

2.5.4.4 *Wabasca Lowlands Ecodistrict (11WL)*

The Wabasca Lowland Ecodistrict is an undulating plain that lies elevationally above the Peace River Lowlands, but significantly below the Pelican Mountains (Strong 1992). It is located in the northern portion of the study area and is composed mostly of morainal deposits with significant organic deposits scattered throughout. Prominent features are the upper drainage basins of the Salt, Shaw, Narrows and Marten creeks. Marten Lakes are present in the extreme northeast corner of the study area.

2.5.4.5 *Athabasca River Valley Ecodistrict (11AV)*

This ecodistrict occurs within the study area along the middle to lower reaches of the Lesser Slave River and to a lesser extent along a small stretch of the Athabasca River above Smith. It includes the glacial channel banks and terraces, and modern fluvial landforms. The boundary is usually a distinctive break-in-slope from surrounding landscapes (Strong 1992).

2.5.4.6 *Southern Alberta Uplands Ecodistrict (11SU)*

This ecodistrict occupies a very small portion of the study area south of Highway No.2 and east of the Swan Hills. It represents the lowest slopes of the Swan Hills which are located to the west and south and is comprised primarily of undulating moraine.

2.5.4.7 *Southern Alberta Uplands Ecodistrict (10SU)*

The Upper Boreal-Cordilleran Ecoregion within the study area is represented by only one ecodistrict - the Southern Alberta Uplands Ecodistrict (10SU). This ecodistrict is comprised of the elevated plateaus (elevations above approximately 920 masl), irregular erosional scarps and strongly rolling topography of the Swan Hills. The parent materials consist of morainal blankets and veneers and pre-Pleistocene (Tertiary) gravels with a very high content of rounded metaquartzite and sandstone cobbles (often 80% by volume). The deposit is normally about one metre thick but may be as thick as three metres in some areas.

2.5.3.8 Pelican Mountains Ecodistrict (9PM)

This ecodistrict is located in the east-central portion of the study area and is described as an isolated linear ridge with moderate slopes, an outlier of the Southern Alberta Uplands (Strong 1992). The surficial materials are dominated by moraine which is severely eroded and dissected; slumping is evident in many areas. The most prominent feature within the study area is Marten Mountain with an elevation of approximately 1000 masl.

2.5.3.9 Southern Alberta Uplands Ecodistrict (9SU)

This ecodistrict occupies a small portion of the study area in the southwest. It is described as a continuous band of rolling terrain that extends from southern Alberta northward to Grande Prairie and eastward across the Swan Hills (Strong 1992). Dominant surficial materials consist of undulating moraine over rolling rock. The terrain is heavily dissected by numerous drainages with the Otauwau River being the most prominent.

2.6 Wildlife

The Lesser Slave Lake area, in addition to supporting many animal species typical of the boreal forest, also supports significant populations of a few notable species such as the American white pelican and the bald eagle. As well, the study area contains suitable habitat for woodland caribou, and is an important production and staging area for waterfowl (Schultz et al. 1991).

Detailed wildlife information for the study area, or portions thereof, can be found in Ealey

(1979), Smith (1969), Holroyd et al. (1987) and Alberta Fish and Wildlife key area maps 83N (1985) and 830 (1989). Additional wildlife information has been summarized in Bradley (1980), Nietfeld et al. (1985), Lombard North Planning Ltd. (1972) and Nordstrom (1979). Therefore, only a brief wildlife synopsis is presented here.

2.6.1 Mammals

Ealey (1979) has listed forty-seven species of mammals which can be expected to occur in the Lesser Slave Lake basin. Some species which may occur in the area include woodland caribou, moose, mule deer, white-tailed deer, fisher, mink and beaver (Ealey 1979, Nietfeld et al. 1985).

Woodland caribou currently exist immediately east and southeast of Lesser Slave Lake and are included in the Mitsue Woodland Caribou Herd (Alberta Fish and Wildlife Services 1993). The Mitsue herd is estimated to have approximately 50 caribou and is designated as a "Group C" herd by Fish and Wildlife Services (1993) in the draft document Strategy for Conservation of Woodland Caribou in Alberta. As stated in the above document, "Group C" herds are considered secondary lands for caribou preservation in Alberta and will be managed to reduce risks and maintain caribou populations as much as possible through normal resource management practices.

The entire study area lies within prime range for moose. Key moose habitat, in this case critical overwintering areas, has been identified within the study area by Alberta Fish and Wildlife (key area maps 83N (1985), 830 (1989). The areas include the Otauwau River valley; part of the Lesser Slave River and the Athabasca River valleys; the entire north shore of Lesser Slave Lake, and the Flat Top area south of the Town of Slave Lake.

Portions of the study area are identified as prime range for mule deer (Neitfeld et al. 1985). The only suitable range for white-tailed deer in the study area is the south half, rated as secondary range (Nietfeld et al. 1985). No key habitat areas have been identified as of yet by

Fish and Wildlife Services for either mule deer or white-tailed deer within the Lesser Slave Lake area.

Important furbearing species in the area include fisher, mink, least and short-tailed weasels, lynx. coyote, beaver, muskrat and red squirrel (Ealey 1979). Red fox, especially cross fox and silver fox colour phases, regularly occur in the area. Wolverines may also occur in the study area.

In the late 1970's, the Lesser Slave Lake and Buffalo Bay areas, with their dense, maturing deciduous forests were considered to be among the most productive fisher trapping areas of the province (Ealey 1979).

Mink have been considered fairly abundant in the Lesser Slave Lake basin (Ealey 1979). Areas rated very good to excellent for mink were the north shore of Lesser Slave Lake from Big Point to the Narrows, the Barrier Beach area at the east end of the lake, and Buffalo Bay (Ealey 1979). The area is not rated as prime beaver habitat, although the Lesser Slave Lake and Buffalo Bay areas are rated as above average in production for muskrat (Ealey 1979).

It is unknown whether grizzly bear still occur in the area, though the study area is rated as secondary range and is immediately north of the primary grizzly range of the Swan Hills (Neitfeld et al. 1985). Sporadic sightings of grizzly bear in the Lesser Slave Lake Provincial Park area have been reported, though these were many years ago (Lombard North 1972). Black bear are fairly abundant throughout the study area.

2.6.2 Avifauna

At least 173 species of birds may occur in the study area (Salt and Salt 1976; Godfrey 1986). Ealey (1979) expects 189 bird species to occur in the Lesser Slave Lake basin with forested bog areas being especially attractive to several species of owl. Probably some of the most important attributes of the area are directly related to its bird populations (Schultz et al. 1991).

Of the seven American white pelican breeding colonies known in Alberta in 1985, two of them were located on rock islands in Utikuma Lake north of Lesser Slave Lake. As well, a third colony has been re-established on a wooded island in the lake (Schultz et al. 1991). These colonies co-exist with double-crested cormorants, and both species feed on yellow perch and lake whitefish in Utikuma Lake (Stepney in Holroyd et al. 1987). Lakes with islands that are important to pelicans as feeding and resting areas are called loafing sites. As of 1985, Lesser Slave Lake was one of 12 known loafing sites in Alberta.

Listed as "threatened" in Canada in 1978 by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) (Brechtel in Holroyd et al. 1987), the American white pelican is currently classed as "vulnerable" by Alberta Fish and Wildlife. The American white pelican is a fish-eater and has historically been subject to prejudice from commercial and sport fishermen in Alberta (Stepney in Holroyd et al. 1987). Natural and man-induced fluctuations in lake levels have affected the occurrence and suitability of nesting islands; human recreation activities have negatively impacted pelican habitat and nesting sites in a number of areas .

Lesser Slave Lake is also very important for waterfowl, though fluctuating water levels and wave action with its subsequent effect on emergent vegetation will affect waterfowl production from year to year. The Canada Land Inventory and Nietfeld et al. (1984) identify Buffalo Bay and the north shore of Lesser Slave Lake west of Big Point as high waterfowl production areas. These areas have been designated as priority wetlands for production, staging and moulting by the Canadian Wildlife Service (Nietfeld et al. 1984). Ealey (1979) also identifies excellent quality habitat for duck production in the marsh and lake complex among old beach dunes at the southeast tip of Lesser Slave Lake and in Buffalo Bay, as well as good or fair quality waterfowl habitat along the southeast shore of Lesser Slave Lake as well as Muskeg and Mitsue lakes.

Another notable attribute of the study area is the presence of a significant population of bald eagles at Lesser Slave Lake, especially along the north shore and along the Lesser Slave River. The bald eagle is not abundant in Alberta, with the total breeding population estimated at less than 200 breeding pairs in 1979 (Ealey 1979). Ealey (1979) observed a highly significant concentration of bald eagles (14 adult and 10 immature) along the margins of Lesser Slave Lake, mostly along the north shore, and concluded at least seven breeding pairs used the lake as a foraging area. During 1993 fieldwork, GEOWEST staff observed approximately 32 adult and immature bald eagles along the north shore of Lesser Slave Lake. In addition to bald eagles, Ealey (1979) noted that 20 species of raptors are expected to occur in the Lesser Slave Lake area including the osprey, marsh hawk and short-eared owl. Two osprey were observed at Muskeg Lake during the 1993 field reconnaissance as well as a number of northern harrier and red-tailed hawks along the north shore.

Ealey (1979) also reported that 90 species of passerines or songbirds are expected to breed in the area. He also noted significant concentrations and/or breeding colonies of western grebes, ring-billed, California and Franklin's gulls, and common and black terns on Lesser Slave Lake.

2.7 Fisheries

Lesser Slave Lake is managed for sport, commercial and domestic fisheries. The sport fishery for walleye and northern pike has been increasing in popularity through the 1980's (Alberta Fish and Wildlife Services, unpublished). The most recent sport fishing angler creel done for Lesser Slave Lake was in 1985 (Fish and Wildlife Services, unpublished). Total harvest included: 17,567 ± 2191 kg for walleye; 7,983 ± 1,455 kg for northern pike; 3,221 ± 1,647 for yellow perch (number of fish, weights not obtained). Commercial fishing seasons and harvests for the last five years are included in Appendix 1.

Fish species known to occur in Lesser Slave Lake are walleye, lake whitefish, cisco, mountain whitefish (rare), Arctic grayling (rare), northern pike, burbot, longnose sucker, white sucker, emerald shiner, spottail shiner, trout perch, brook stickleback (rare), yellow perch, and spoonhead sculpin (rare) (Fish and Wildlife Services, unpublished). Lake trout were abundant in the lake during the early 1900's but were extirpated by the early 1940's (Paetz and Zelt 1974 in Alberta Environment, unpublished).

In addition to Lesser Slave Lake, a number of other lakes, rivers and creeks in the study area provide sport fishing opportunities (Fish and Wildlife Services, unpublished). Mitsue Lake has a significant recreational northern pike sport fishery in both summer and winter. Marten Lakes have been commercially fished occasionally for lake whitefish but are very limited as a recreational fishery because of poor access. Lily Lake has a recreational brook trout fishery and it is stocked on alternate years with 4,000 brook trout fingerlings (Fish and Wildlife Services, unpublished).

The Lesser Slave Lake River provides an important sport fishery for northern pike, walleye and goldeye. Most fishing occurs in the upper end near Lesser Slave Lake. Arctic grayling are fished in a number of the smaller rivers and creeks in the area including the Saulteaux and Otauwau rivers and Sawridge, Assineau, Marten and Oilman's creeks.

2.8 Lake Basin Characteristics of Lesser Slave Lake

Lesser Slave Lake is the second largest body of water in Alberta. The drainage basin is approximately 12,400 km^2 or 11 times greater than that of the lake (Bradford and Hanson, 1990). Four major inlets, South Heart, Driftpile River, Swan River and Assineau River drain the southwestern portion of the watershed. Numerous other minor drainages flow into the lake. The only outlet, the Lesser Slave River, is located at the east end of the lake and joins the Athabasca River as a tributary at a point 75 kilometres downstream.

Lesser Slave Lake is a eutrophic lake with a surface area of 1160 km^2 and a maximum depth of 20.5 m (Bradford and Hanson, 1990). It has en elongated shape with a maximum length and width of approximately 87 km and 17 km, respectively. A summary of lake basin characteristics is provided in Table 3.

The lake has a variable littoral zone. The east basin has a relatively small littoral zone with the bottom sloping sharply to 17.5 m to a maximum of 20.5 m with the exception of the east shore which slopes more gradually. The west basin has a fairly large littoral zone with gradually sloping bottoms to a maximum of 15.5 m. The exception is the north and south-central shores which are similar to the east basin.

Table 3. Lake basin characteristics of Lesser Slave Lake[1]

Drainage basin area (km^2)	12,400
Elevation (masl)	576.61
Surface area (km^2)	1,160
Volume (m^3)	13,200 X 10^6
Maximum depth (m)	20.5
Mean depth (m)	11.4
Shoreline length (km)	241
Shoreline development factor	NA
Mean annual inflow (m^3)	1.550 X 10^6
Control structure	Short pile weir
Terrain	Level to rolling

[1] from Bradford and Hanson (1990)

3.0 METHODS

3.1 Evaluation of Significant Ecological Features

3.1.1 Classification Criteria

Potential sites or features within the Lesser Slave Lake study area were evaluated for their environmental significance using 14 criteria or components of the natural environmental identified by Eagles (1984). This included:

- Areas which perform a vital environmental, ecological or hydrological function such as aquifer recharge.

- Areas which contain rare or unique geological or physiographic features.

- Areas which contain significant, rare of endangered plant or animal species.

- Areas which are unique habitats with limited representation in the region or are a small remnant of once large habitats which have virtually disappeared.

- Areas which contain an unusual diversity of plant and/or animal communities due to a variety of geomorphological features and microclimatic effects.

- Areas which contain large and relatively undisturbed habitats and provide sheltered habitat or species which are intolerant of human disturbance.

- Areas which provide an important linking function and permit the movement of wildlife over considerable distances, including migration corridors and migratory stopover points.

- Areas which contain plants, animals or landforms which are unusual or are of local, regional, provincial, national or international significance.

- Areas that are excellent representatives of one or more ecosystems, habitats, or landscapes that are outlined in Natural History Themes of Alberta, Alberta Parks and Recreation, 1993.

- Areas with intrinsic appeal due to widespread community interest or the presence of highly valued features or wildlife species valued for hunting.

- Areas with lengthy histories of scientific research.

- Areas containing specific old growth values or older forest stands.

- Areas which perform a vital function for wildlife in the area.

- Areas with cultural, historical or archaeological significance.

These environmental components or criteria are consistent with those used in environmentally significant areas (ESA) studies conducted in the settled areas of the province as well as with current concepts in environmental planning used in developing environmentally significant areas criteria and classification methodologies.

3.1.2 Levels of Significance

The environmental significance of each site was assessed with respect to the following categories (Eagles 1984):

International - features which are unique in the world.

National - features which are limited in distribution at a national level or which are the best or only representatives in Canada.

Provincial - features which are of limited distribution or are the best examples of a feature in the province.

Regional - features which are of limited distribution or are the best examples of a feature in the region.

Local - features which are of limited distribution or are the best examples of a feature in the study area.

Evaluating areas in terms of their level of significance requires considerable knowledge of significant features both inside and outside the jurisdiction under study. In some cases, this is facilitated by lists of rare, threatened and endangered species (COSEWIC 1990; Wershler 1985; Wallis 1977; and Packer and Bradley 1984) or evaluations of natural ecosystem complexes or landscapes (Achuff et al. 1988) that are available at provincial, national and international levels. In some fields, notably geology, there have been very few studies that summarize the significance or distribution of features (Cottonwood Consultants Ltd. 1991). In these cases, professional judgement by several researchers has been used to determine the level of significance.

Examples of locally significant features include:

- hydrologically important creeks and lakes
- habitats which support populations of plants or animals that are locally rare or uncommon
- examples within the study area of areas with high landform, vegetation or wildlife diversity
- lakes or creeks that support a locally important sport fishery

Examples of regionally significant features include:

- hydrologically significant rivers, creeks and lakes
- habitats which support populations of plants or animals that are rare in the region
- areas of unusually high landform, vegetation or wildlife diversity
- lakes supporting important commercial, domestic or sport fisheries
- rivers and streams supporting spawning populations of important sportfish species such as Arctic grayling or walleye
- important wintering areas for moose
- important wildlife movement corridors
- key habitat areas for sensitive furbearing species such as otter, marten, lynx and wolverine
- Natural Area reservations

Examples of provincially significant features include:

- hydrologically important rivers
- provincially significant waterfowl staging and production areas
- habitats which support populations of plants or animals (eg. bald eagle, woodland caribou) that are rare or uncommon in Alberta
- areas of unusually high landform, vegetation or wildlife diversity
- provincially designated Natural Areas

Examples of nationally significant features include:

- interprovincially important watercourses

3.2 Data Collection

3.2.1 Aerial Photograph Interpretation

Airphoto interpretation of the study area was conducted using 1986 and 1992 1:40,000 black and white aerial photographs. In conjunction with 1:250,000 access and 1:50,000 NTS maps, major landscape units and vegetation types, and features of potential interest were identified in the study area and delineated on 1:100,000 base maps.

No minimum size criteria were used in identifying sites containing significant ecological features. Instead, significant natural sites were selected on the basis of their environmental significance, ecological function, rarity and/or sensitivity, regardless of size. Some features, such as unique vegetation or terrain features, are not readily identifiable on 1:40,000 aerial photographs while certain wildlife features may be significant because of their size and contiguity with other features (D.A. Westworth & Associates 1990).

During airphoto interpretation, the following were identified:

- areas of vegetation diversity
- areas of landform diversity
- major stands of old-growth or climax forest
- areas with interesting, unique of unusual landscape features (e.g. sand dune complexes, beach ridge formations)
- areas with important hydrological or hydrogeological functions (e.g. major springs, discharge areas, lakes, rivers and creeks)
- areas that provide excellent examples of geological formations or natural ecosystems and
- major wetlands and peatlands

3.2.2 Literature Review

A comprehensive review of all available published and unpublished reports and maps from government agencies, university libraries and private sector sources was conducted. This included literature and data files maintained by Resource Information Division (Alberta Environmental Protection), Alberta Fish and Wildlife Services, Alberta Natural and Protected

Areas, Alberta Environment, Provincial Museum of Alberta, Alberta Parks Service and Alberta Forest Service.

Previous biophysical studies conducted in the Lesser Slave Lake area by GEOWEST Environmental Consultants Ltd. (Schultz and Bentz 1993) and the Resource Information Division (Schultz et al. 1991) were utilized to compile background data for the study area. The study *"Significant Natural Features of the Eastern Boreal Forest Region of Alberta"* conducted by D.A. Westworth & Associates Ltd. (1990) covered the area east of the Saulteaux River in the study area. Information about several overlapping sites between the two study areas was incorporated in this study.

3.2.3 Interviews

In addition to the literature review, as many interviews as possible were conducted with scientists, government personnel and other knowledgable people to obtain any additional information on potential environmentally significant features. Individuals associated with various government agencies including Alberta Fish and Wildlife Services, Alberta Parks Service, Alberta Forest Service, Canadian Wildlife Service, the Provincial Museum of Alberta and Historic Resources of Alberta Community Development were contacted. Knowledgable people in the university, naturalist and environmental conservation community were also contacted for input.

Public input about the study was also solicited at a "Special Places 2000" open house at Slave Lake in September, 1993 and at a round-table meeting and open house in October, 1993 at Slave Lake in conjunction with the Integrated Resource Plan *"Terms of Reference"* review.

3.2.4 Field Reconnaissance

A reconnaissance field survey was conducted to evaluate or confirm the significance of candidate sites identified from the literature review, interviews and airphoto interpretation. Ground inspections were limited due to access and most sites were visited during a series of helicopter surveys conducted in mid-August, 1993. Since the scope of the study did not permit detailed sampling, field evaluations were of a general nature, providing the study team with an opportunity to make a professional judgement about the characteristics and significance of each site. Photographs were taken of each site and information on features such as community type, successional stage, presence of rare plant or wildlife species, travel corridors, mineral springs, general wildlife use and habitat condition were recorded in field notebooks.

Field data collected by GEOWEST Environmental Consultants in the study area (vegetation, soils, site data) in conjunction with previous biophysical inventories were also utilized to characterize SEFs.

3.3 Evaluation of Sensitivity of Significant Ecological Features

The sensitivity of significant features to anthropogenic disturbance was evaluated as follows:

High - the disturbance can be expected to result in a complete loss of the significant natural feature or require major mitigation and very restrictive operating conditions to maintain the vital ecological functions of the feature.

Moderate - the disturbance will result in considerable loss in modification of the significant natural feature. Significant mitigation and restrictive operating conditions are likely required to maintain the vital ecological functions of the feature.

Low - the disturbance will result in minor loss or modification to the significant natural feature. Some mitigation and normal operating restrictions may be required to maintain the long term viability and vitality of the feature.

Insignificant - the disturbance will have no measurable impact on the significant ecological feature.

Sensitivity evaluation of the following disturbances was included:

- hunting, fishing and trapping
- non-consumptive wilderness recreation (eg. wildlife viewing, primitive camping, cross-country skiing, canoeing, hiking)
- facility-oriented recreational development
- roads and highways
- utility corridors
- oil and gas exploration and development
- timber harvesting
- grazing
- municipal/industrial facility development
- off-road motorized vehicles

3.4 Database Preparation

A digital database was prepared that incorporated the key characteristics of each significant ecological feature identified in the study. The database was formatted in dBASE IV and was structured in such a way as to be easily incorporated with spatial data files for GIS analysis and presentation.

As specified in the study Terms of References, the following fields were incorporated in the database:

Field Name	Type	Field Position
Municode	N	1-4
Site Number	N	5-7
Site Name	C	8-37
Township	N	38-40
Range	N	41-42
Meridian	N	43
Section	N	44-45
Legal Sub.	N	46-47
NTS Mapsheet	C/N	48-52
Theme 1	N	53
Criteria 1	N	54-55
Significance 1	N	56
Sensitivity 1	C	57
Sensitivity 2	C	58
Sensitivity 3	C	59
Sensitivity 4	C	60
Sensitivity 5	C	61
Sensitivity 6	C	62
Sensitivity 7	C	63
Sensitivity 8	C	64
Sensitivity 9	C	65
Sensitivity 10	C	66
Features	Memo	67-105

Theme Codes

1 - Landform
2 - Wetland
3 - Hydrology
4 - Vegetation
5 - Wildlife
6 - Fisheries
7 - Scientific
8 - Cultural

Significance Codes

1 - International
2 - National
3 - Provincial
4 - Regional
5 - Local

Criteria Codes

Code	Criteria
1	Hazard lands
2	Environmental, ecological or hydrological function
3	Rare or unique geological or physiographic feature
4	Significant, rare or endangered plant or animal species
5	Unique habitats with limited representation in the region or remnant habitats
6	Unusual diversity of plant or animal communities due to a variety of geomorphological features and microclimatic effects
7	Large, relatively undisturbed habitats and habitat for species intolerant of humans
8	Important linking function permitting movement of wildlife over considerable distance, including migration corridors and stopover points
9	Excellent representation of one or more ecosystems or landscapes that characterizes a natural region
10	Intrinsic appeal due to widespread community interest or presence of highly valued features or species such as game species or sport fish
11	History of scientific research
12	High aesthetic value

Sensitivity Codes

H - High
M - Moderate
L - Low
I - Insignificant

Sensitivity - Land Use Activities

1 - Hunting, fishing and trapping
2 - Non-consumptive wilderness recreation
3 - Facility-oriented recreational development
4 - Roads and highways
5 - Utility corridors
6 - Oil and gas exploration and development
7 - Timber harvesting
8 - Grazing
9 - Municipal/industrial facility development
10 - Off-road motorized vehicles

3.5 Digital Map Production

Significant ecological feature boundaries were delineated on a 1:100,000 scale base map and subsequently transferred to a series of four clear acetate overlays corresponding to SEF thematic groupings. Polygon information was then digitized using Intergraph Microstation PC software resulting in the production of four Intergraph DGN files. Digital base map information derived from provincial 1:20,000 digital base files was provided by the Resource Information Division.

The four thematic Intergraph DGN files were merged for the final composite digital map production (see map pocket) which shows the location of all SEFs in the study area, with appropriate shading used to indicate the level of significance of each SEF. Thematic groupings of SEFs are illustrated in the accompanying legend.

4.0 INVENTORY OF SIGNIFICANT ECOLOGICAL FEATURES

Through an iterative process that involved a review of available published and unpublished information for the Lesser Slave Lake study area, interviews with individuals knowledgable about the area, aerial photo interpretation and field surveys, a final list of 51 significant ecological features (SEFs) was compiled. Of these sites, one was classified as nationally significant, 12 as provincially significant, 20 as regionally significant and 18 as locally significant. A large proportion of the SEFs are comprised of features associated with lakes, rivers, creeks and wetlands.

A detailed description or checklist of each SEF is provided in Section 8.0. In addition, relevant information on each SEF is provided in a digital database file which was utilized in the production of the final digital maps of SEF locations. A copy of the database is included in Appendix 2.

Locations of SEFs are provided on a 1:100,000 scale digitally produced map included with the report. Because of differences in functions and values of individual SEFs, many have overlapping boundaries. To assist in the identification of individual SEFs, information was initially presented thematically on four map sheets. These were digitized separately with a different spatial digital file produced for each thematic grouping. The following thematic groupings were utilized:

- Landforms and Hydrology
- Vegetation and Wetlands
- Wildlife and Fisheries
- Scientific and Cultural

A composite map was then produced showing the location of all SEFs, with shading used to illustrate levels of significance (see map pocket).

Following is a summary of significant ecological features identified in the Lesser Slave Lake study area as well as a listing of the key features associated with each SEF:

Nationally Significant Sites

Site Name	Key Features
Athabasca River (page 69)	-nationally significant watercourse -major wildlife corridor and fisheries habitat

Provincially Significant Sites

Site Name	Key Features
Chisholm Ribbed Fen (page 70)	-significant landform feature -key hydrological feature -key woodland caribou habitat
Hondo Natural Area (page 71)	-designated as an Educational Natural Area
Lesser Slave Lake Horizontal Fen (page 72)	-significant landform feature -key hydrological feature -key woodland caribou habitat
Lesser Slave Lake - North Shore (page 73)	-key fisheries spawning and rearing habitat -key waterfowl staging and production area -key bald eagle habitat -key recreational resource
Lesser Slave River - West Reach (page 75)	-key fisheries habitat -significant hydrological feature -key wildlife movement corridor -key bald eagle habitat
Lesser Slave River - East Reach (page 77)	-key fisheries habitat -significant hydrological feature -key wildlife movement corridor -key bald eagle habitat -important recreational watercourse
Marten Mountain (page 78)	-unique landform feature -high vegetation and wildlife diversity

Mitsue Woodland Caribou Range (page 79)	-key woodland caribou habitat -high landform and vegetation diversity
North Shore Moose Area (page 80)	-key moose range -key furbearer habitat -high landform and vegetation diversity -key raptor and songbird habitat
Otauwau Natural Area (page 81)	-designated as an Educational Natural Area
Police Point Natural Area (page 82)	-designated as an Educational Natural Area
Saulteaux Natural Area (page 83)	-designated as an Educational Natural Area

Regionally Significant Sites

Site Names	Key Features
Flat Top Moose Area (page 84)	-significant moose habitat -high landform and vegetation diversity
Lesser Slave Lake - Southeast Shoreline (page 85)	-key waterfowl production and staging -American white pelican loafing and foraging area -key fisheries spawning and rearing habitat
Lily Lake (page 86)	-significant hydrological feature -brook trout sport fishery -important recreational feature
Marten Creek (page 87)	-significant hydrological and landform feature -significant sport fishery -key wildlife movement corridor -riparian vegetation
Marten Lakes (page 88)	-significant hydrological and landform feature -commercial and sport fishery
Mitsue Lake (page 89)	-significant hydrological feature -waterfowl production and staging -northern pike and yellow perch sport fishery -bald eagle foraging area
Mitsue Lake Natural Area Reservation (page 90)	-research and educational site for University of Alberta

Mooney Creek (page 91)	-significant hydrological feature -Arctic grayling spawning
Muskeg Creek (page 92)	-important hydrological feature -northern pike spawning
Muskeg Lake (page 93)	-significant hydrological feature -waterfowl production and staging -raptor foraging habitat
Narrows Creek Peatland Complex (page 94)	-significant hydrological and landform feature -key moose and aquatic furbearer habitat -high vegetation diversity
North Narrows Creek Old Growth Forest (page 95)	-old-growth mixedwood and coniferous forest -key moose, furbearer and songbird habitat
Otauwau River (page 96)	-significant hydrological feature -key furbearer and ungulate habitat -key fisheries habitat
Otauwau River Natural Area Reservation (page 97)	-research and educational site for University of Alberta
Saulteaux River (page 98)	-significant hydrological feature -key furbearer and ungulate habitat -key sport fishery and spawning and habitat for Arctic grayling
Sawridge Creek (page 99)	-significant hydrological and landform feature -Arctic grayling spawning -wildlife movement corridor -riparian vegetation
Southeast Beach Ridge - Peatland Complex (page 100)	-unique beach ridge, sand dune, lake and wetland complex -high landform and vegetation diversity -waterfowl production and staging
Oilman's Creek (page 101)	-significant hydrological feature -Arctic grayling spawning habitat -key moose range
Unnamed Lakes - Saulteaux Peatland Complex (page 102)	-significant hydrological feature -waterfowl production and staging -aquatic furbearer habitat -high vegetation diversity

Willow River (page 103)	-significant hydrological feature -Arctic grayling spawning

Locally Significant Sites

Site Name	Key Features
Assineau River Point (Willow Point) (page 104)	-waterfowl and shorebird production and foraging area -American white pelican foraging and loafing area
Cabin Creek (page 105)	-hydrological feature and unique fluvial landform -aquatic furbearer habitat -wildlife movement corridor
Eating Creek (page 106)	-hydrological feature -wildlife movement corridor
Florida Creek (page 107)	-hydrological feature -wildlife movement corridor
Florida Lake (page 108)	-hydrological feature -key moose range
Lily Creek (page 109)	-hydrological feature -old-growth riparian forest -wildlife movement corridor
Mitsue Creek (page 110)	-hydrological feature -northern pike spawning habitat
Narrows Creek (page 111)	-hydrological feature -aquatic furbearer habitat -high vegetation diversity
Nine Mile Point (page 112)	-significant landform feature -key offshore waterfowl and shorebird production and staging
Pastecho River (page 113)	-hydrological feature -aquatic furbearer habitat
Salt Creek (page 114)	-hydrological feature -aquatic furbearer habitat
Shaw Creek (page 115)	-hydrological feature -aquatic furbearer habitat

Shaw Creek Peatlands (page 116)	-hydrological and landform feature -key moose range
Unnamed North Shore Lakes (page 117)	-hydrological features -waterfowl production and staging -aquatic furbearer habitat
Unnamed Lakes - Marten Mountain (page 118)	-hydrological features -aquatic furbearer habitat
Unnamed Lake (page 119)	-hydrological feature -waterfowl production and staging -aquatic furbearer habitat
Unnamed Lakes (page 120)	-hydrological features -minor waterfowl production -aquatic furbearer habitat
Unnamed Lake - Flat Top (page 121)	-hydrological feature -minor waterfowl production -key moose habitat

5.0 SENSITIVITY OF SIGNIFICANT ECOLOGICAL FEATURES

Sensitivity ratings of significant ecological features can provide an additional source of information for assessing potential effects of various types of land uses or development. In this study, environmental sensitivity ratings were considered to be an evaluation of site or land performance in response to various types of land use or disturbance. Changes resulting from development activities and surface disturbance can be measured in terms of soil, vegetation, wildlife habitat and hydrological parameters, as well in terms of land use and social and economic values (D.A. Westworth & Associates Ltd. 1990). Some disturbances involve minor, short-term changes that can be easily remedied with normal operating procedures while other lands may be more sensitive to disturbances because they contain one or more of the following characteristics:

- a very high susceptibility to erosion or ground disturbance
- severe limitations to revegetation, or
- distinctive, rare or unusual landforms, wildlife populations or plant communities that are regionally, provincially, nationally or internationally important.

Categories of significant natural features that were rated highly sensitive to a particular land use activity are expected to result in a total loss of environmental significance or value, or would at the very least, require major mitigation and very restrictive operating conditions to maintain their vital ecological functions. For example, landform/soil/vegetation units that are highly erodible, droughty, steep or unstable and have poor soil qualities would be considered highly sensitive to most land use activities (D.A. Westworth & Associates Ltd. 1990). This may include eolian terrain (ie.sand dune formations) which have low trafficability, are extremely vulnerable to wind and water erosion and require special revegetation practices because of the coarse textured soils and low levels of water and nutrient supplies for plants. Because of their high productivity and importance to fish and wildlife, wetlands and riparian zones are classified as highly sensitive to many types of land uses as well.

Moderate sensitivity ratings were assigned to those land use activities that may result in considerable changes to, or a considerable reduction in environmental significance of the site. Moderately sensitive significant ecological features require restrictive operating guidelines for site or route selection and timing and consequently, require detailed mitigation plans if effective protection of the site is to be achieved. Significant ecological features that are classified as low and insignificant are expected to withstand most types of land use activity within normal operating conditions.

In the present study, steep slopes, rare species/plant communities, old-growth forests, caribou habitat and eolian landforms were considered to be highly sensitive to most land use activities (Table 4). In terms of land uses, activities related to hunting, trapping, fishing and non-consumptive wilderness recreation were considered to have the least effect on significant ecological features in the Lesser Slave Lake study area while facility-oriented recreational and municipal/industrial related activities were rated as having the highest potential impact. Timber harvesting and oil and gas exploration and development were considered to have moderate impacts on most sites except for those with rare plant species or communities, old-growth forest or key caribou range. In these types of sites, a "high" rating was assigned.

Table 4. Sensitivity of significant ecological features to major types of land use activities.

	Types of Land Use Activity									
H - Highly Sensitive M - Moderately Sensitive L - Low Sensitivity I - Insignificant Sensitivity **Category of Significant Ecological Features**	Hunting, Fishing and Trapping	Non-consumptive Wilderness Recreation	Facility-oriented Recreational Development	Roads and Highways	Utility Corridors	Oil & Gas Exploration and Development	Timber Harvesting	Grazing	Municipal/Industrial Facility Development	Off-road Motorized Vehicles
TERRAIN FEATURES:										
Glacial	I	I	M	M	M	M	L	L	H	M
Fluvial	I	I	H	H	M	M	M	L	H	H
Eolian	L	L	H	H	H	H	H	M	H	H
Slopes	L	L	H	H	H	H	H	M	H	H
Peatlands	L	L	H	H	M	M	M	M	H	H
HYDROLOGICAL FEATURES:										
Rivers and Creeks	L	L	M	M	M	M	M	M	M	H
Lakes	L	L	M	M	M	M	M	M	M	L
Springs/Seeps	L	L	H	H	M	M	M	M	H	H
VEGETATION FEATURES:										
Rare Species/Plant Communities	L	M	H	H	H	H	H	H	H	H
Old-Growth Forests	L	L	H	H	H	H	H	H	H	H
KEY WILDLIFE HABITATS:										
Caribou	M	M	H	H	M	H	H	H	H	H
Moose	M	L	M	H	M	M	M	M	M	H
Furbearers	M	L	M	M	M	M	M	M	M	M
Colonial Nesting Birds	M	M	H	M	M	H	M	M	H	M
Waterfowl	M	L	M	M	L	M	M	M	H	M
FISH	M	L	M	H	M	M	M	M	M	M

6.0 MANAGEMENT CONSIDERATIONS

6.1 Landform and Hydrological Features

6.1.1 Soils and Landform

The most threatening activities for environmentally significant landforms are intensive disturbance operations such as sand and gravel extraction, open-pit mining, road construction and municipal and industrial development (D.A. Westworth & Associates 1990). Within the study area, land use activities associated with the forestry and oil and gas industries are the most prevalent.

Soil condition is the key factor in maintaining the long-term productivity of a site. The soil biological community performs a variety of important functions including nutrient cycling, nitrogen fixation, protection against pathogens, and moisture provision (Amaranthus et al. 1989). Activities such as timber harvesting, road construction and facility development can alter the soil's capacity to perform these functions by affecting the processes of compaction, erosion and sedimentation. Although logging is carried out primarily during the winter season in the Lesser Slave Lake area in an effort to minimize site disturbance, some level of disturbance is inevitable given repeated and progressively harsher extraction methods.

Soil compaction is often one of the most devastating results of land use disturbances such as heavy logging and road construction as it destroys the all-important structure of the soil. Soil density and porosity are essential characteristics in defining the transfer of oxygen and water into the soil and carbon dioxide out of it. Undisturbed soils have large pores that permit the downward percolation of water, however, when these soils become compacted, water movement is reduced.

Surface disturbance, as opposed to deep soil compaction, can also have deleterious impacts on site productivity. Topsoil is a "biological reservoir" of nutrients and fungal spores and displacement of this topsoil by machinery can alter soil structure and function (Amaranthus et al. 1989). The loss of structural features, such as pores, renders the soil "puddled" and reduces its capacity to percolate water, thus increasing its susceptibility to erosion (Childs et al. 1989)

Sidle (1989) has quantified the cumulative effects of linear developments in conjunction with resource exploitation activities such as logging on forest soil erosion and sedimentation into four levels: (1) on-site mass erosion, (2) on-site surface erosion, (3) sediment transport, and (4) downstream effects. Given the generally low relief terrain of the study area, mass erosion in the forms of landslides and debris slides are generally not applicable. Surface erosion is of much more immediate concern, however, as localized areas of overland flow are caused by compaction and degradation of soils.

Moisture is frequently identified as a major factor dictating the level of growth and development of forest vegetation. Water has the capacity for high thermal conductivity and moist soils, therefore, conduct heat more efficiently than do dry soils. In considering the hydrological impacts of logging, for example, two basic classifications must be dealt with - surface water and sub-surface water.

Sub-surface water consists of soil water (in the aeration zone) and ground water (in the deeper saturation zone). The pores within the soil complex in the aeration zone contain both water and air. At the depth where all pores become filled with water, the zone of saturation begins. The two zones of sub-surface waters are separated by the "water table". Topographical variation, however, in areas with high local relief, results in some variation to the water table elevation in these areas.

Soil water storage generally increases in the short term following clearcut logging due to the elimination of water loss through evapotranspiration. Unfortunately, subsequent site preparation treatments can alter these effects significantly by loosening the surface soil (Hungerford 1980). Loosened soil dries very quickly and moisture loss is, therefore, greater from exposed mineral soil than from soil protected by residues. Soil water storage capacity can be decreased by a reckless harvesting procedure which involves removal of soil, soil compaction, or decrease in organic matter content. These factors (which decrease soil water storage) are detrimental to productivity (Childs et al. 1989).

Water transport properties will also be affected by logging activities. A rise in water table often follows logging and can result in changes in nutrient cycling ability of the site. Pore size and distribution will affect infiltration and flow of water and will thus affect root water uptake and evapotranspirational processes (Childs et al. 1989).

6.1.2 Peatlands

Peatlands cover a significant component of the study area and are likely the dominant landform on an areal basis. Peatlands are an extremely important ecological resource in the area and serve numerous functions including:

- as a reservoir for surface water and stabilizing stream flows
- as important wetland buffers, reducing the effects of siltation and other impacts resulting from land disturbance on aquatic habitats
- provision of habitat for a diversity of wildlife species

Nicholson (1991) identified two peatland areas located in the study area that are considered to be examples of the highest priority peatlands for preservation in Alberta. These include the Lesser Slave Lake horizontal fen located on the east side of Lesser Slave Lake which contains a variety of peatland types including open, non-patterned fens, forested fens, and *Sphagnum* peat plateaus. The second peatland identified was the Chisholm fen complex which is a large fen and sand dune complex with a tamarack-dominated peatland with prominent reticulate patterned ribbing.

Diverse peatland areas also occur north of Lesser Slave Lake, particularly in the vicinity of Narrows Creek and Shaw Creek.

Peatlands are very sensitive to alteration of water levels. Linear developments such as road and trail construction should be carefully planned so as not to disrupt local hydrological regimes and groundwater flow.

6.1.3 Hydrological Features

Riparian habitats are dominant features of the Lesser Slave Lake area. Numerous water courses, tributaries, secondary channels, oxbows and backwaters support a diverse complex of biota. They are susceptible to land use disturbances due to increased siltation, loss of shade, shorter run-off season, and jamming of watercourses by debris. Violations of the buffer strip requirements as stated in the Alberta Timber Planning and Operating Ground Rules, and cutblocks that extend uninterrupted across small waterways and to the edge of large waterbodies can be extremely detrimental to fisheries resources.

The primary impact of erosion and sedimentation will likely be on downstream resources. Downstream sedimentation can deteriorate spawning sites and alter riparian vegetation and habitats.

Surface water represents the amount of water on the land surface and its role in hydrology is extensive. When concerned with the effects of logging on surface water levels, however, primary consideration must be given to the rate of water flow in rivers, streams, and small channels. As previously discussed, erosional processes can drastically alter the amount and/or distribution of surface water on a site following clearcut logging. In large forest clearings where excessive snow has been allowed to collect, significant amounts of snowmelt may add detrimental amounts of surface water to the site. On a test site in Montana, Newman and Schmidt (1980) found snow accumulation in clearcuts to increase by 80 per cent in relation to uncut areas.

6.2 Vegetation Features

6.2.1 Rare Plants and Plant Communities

Little is known of the extent or local population size and distribution, specific life history or habitat requirements of the rare or significant plant species in the study area. The reconnaissance nature of this inventory did not allow a detained inventory or assessment of rare plant species.

Recent lists of rare vascular plant species for the province can be found in Packer and Bradley (1984) and Wallis (1986). Plant species lists for the area can be found in Bradley (1980) and Ealey and Thompson (1979).

Until more information is collected about the location and population size of rare plants or plant communities in the area, the best management action will be to conserve a diverse cross-section of natural, undisturbed habitats. In general, more extensive areas of habitat are preferable to smaller ones because more extensive areas generally contain larger, more viable populations, sustain less edge-effect from adjacent disturbances, and are better buffers against disturbances (D.A. Westworth & Associates Ltd. 1990).

The most serious threat to rare or uncommon assemblages of plants in the study area is from land uses such as timber harvesting, oil and gas exploration and development and industrial development.

Removal of the forest canopy through timber harvesting, road building etc. is one of the most radical land use activities possible. Through this process, a wide range of environmental conditions are changed simultaneously, with drastic effects on the plant species supported, or formerly supported, by the forest.

Changes in structure and composition as a result of logging occur at varying levels. At the stand level, structural simplification in the form of loss of snags and downed logs can result in a potential loss of ecological diversity. At the landscape level, large-scale spatial modifications by logging can significantly alter the capacity of a forested area to function as a viable ecosystem. At this level, the effects may be categorized more as temporal than spatial, as the length of successional stages, rather than their presence *per se*, has been altered by the logging process (Franklin et al. 1989).

Subsequent loss and changes to species composition of understorey vegetation is a key negative impact of logging old-growth forests. Understorey vegetation serves to increase wildlife values as well as protect soil resources. The sudden influx of wind, precipitation, and temperature extremes resulting from opening of the canopy often is deleterious to understorey features. Plants of the early successional stages are important because they are the ones which facilitate the symbiotic process of nitrogen fixation (Franklin et al. 1989). Schmidt (1980) compared understorey vegetation response to various types of harvest and found that shelterwood cutting patterns (which afforded protection of the understorey) recovered logging-caused shrub loss most effectively, thus emphasizing the importance of mature overstorey in maintaining a healthy understorey. In the post-logged environment, Packer and Williams (1980) found that the production of herbaceous above-ground biomass was greatest (980 pounds per acre) on sites where logging residue was removed and existing understorey was not damaged.

Laurance (1991) found that a common feature of habitat fragmentation is a sharp increase in the amount of induced edge habitat. Consequently, plant and animal populations in fragmented habitats are not only reduced and subdivided, they are increasingly exposed to ecological changes associated with induced edges. Edge effects in fragments are remarkably diverse; they include proliferation of shade-intolerant vegetation along fragment margins as well as changes in microclimate and light regimes that affect seedling germination and survival. Forest interiors are often bombarded by a seed rain of weedy propagules and by animals originating from outside habitats. Increased wind shear forces near edges can cause elevated rates of tree fall and tree mortality that alter forest structure and composition. Edge effects are especially powerful forces when fragments are small or irregularly shaped or when the gradient between natural and modified habitats is steep. In different habitats and for different taxa, research has shown that edge effects may penetrate from 15 m (Ranney *et al.* 1981) to 5 km (Janzen 1986).

Thomas (1979) found that an increase in interspersion increases the amount of edge; this in turn may increase the diversity or the variety that exists in plant and animal communities. Increased diversity in plant communities provides an increasing number of habitat niches which, in turn, support more animal species. A forest, according to Thomas (1979), with a high degree of diversity of communities and successional stages provides habitat for a wide variety of wildlife. Increased diversity is thought to be related to community stability and hence, its ability to return to its original state after severe alteration.

Associated with the harvest of merchantable timber is also generally a distinct lack of preservation of dead trees, downed logs, and woody debris. Ecologically, "a dead tree is as important to the forest ecosystem as a live one ... and by the time a tree dies, it has probably fulfilled only about half of its life in the ecosystem" (Franklin et al. 1989). The role of snags as habitat for a variety of wildlife species is discussed in later sections. Woody debris also plays an important ecological role by influencing channel formation in large rivers, providing a source of soil organic matter, and dissipating energy in waterway logjams to reduce channel erosion. Due to the transient nature of wood structures, as described by Franklin et al. (1989), retention of existing snags in a harvest pattern may not be sufficient mitigation. Overmature and mature, green trees of varying ages and differing stages of decay need to be retained as future sources of snags and woody debris.

The removal of shoreline vegetation along watercourses can result in the loss of shade which had been provided by riparian stands and, subsequently, in-stream photosynthesis and stream temperature can be altered. Riparian vegetation also represents a major source of nutrient transfer between terrestrial and aquatic systems (Franklin et al. 1989).

The size of logged clearcuts will affect factors such as windthrow and species composition in the new and/or remaining stands. Given the large, open clearings (and associated climatic alterations), introduced species will be able to invade the area and establish growth. Seed dispersal of hardwoods and non-native species will be more effective due to increased wind action. Increased wind action will also make residual stands more susceptible to blowdown.

Among the non-vascular plants, the ones most directly affected by logging will be the feathermosses that form much of the forest floor cover. Opening of the canopy and the resultant microclimate change will dry the moss layer and render it ineffective as a potential seedbed for spruce seedling germination.

6.2.2 Old-Growth Forests

At present, there are no legislated provincial guidelines governing the proportion or amount of old-growth forest to be retained for maintenance or preservation of old-growth dependent species. There is clearly a need to develop an old-growth strategy for Alberta prior to extensive timber harvesting in the boreal mixedwood region of the province. There is also a need to consider not only the amount of old-growth habitat required for adequate preservation, but the temporal and spatial arrangement of old-growth habitat (D.A. Westworth & Associates Ltd. 1990). An excellent review of concepts and issues related to old-growth forest management in the boreal forest is provided by Fairbarns (1991).

In the absence of an old-growth strategy for the province, it is important that forest companies and provincial management agencies attempt to conserve representative large blocks of mature and old-growth forest throughout the boreal forest ecoregions of the province, including the Lesser Slave Lake region.

Snags, deadfall, and blowdown are characteristic features of mature and old-growth mixedwood and coniferous forests. Many bird species rely on snags for nesting locations and as a source of insect forage. Birds such as woodpeckers (F. *Picidae*) and various passerines depend on snags as nesting and/or roosting sites (Scott et al. 1977). Mammalian species that utilize snags or deadfall include marten (*Martes americana*), fisher (*Martes pennanti*), northern flying squirrel

(*Glaucomys sabrinus*), bats (F. *Vespertilionidae*), and black bears (*Ursus americanus*). A few residual snags may be salvaged in some cut areas during timber harvesting, but they are generally isolated and probably prone to easy windfall. These snags may, however, represent important perch sites for raptors. Birds of prey should benefit from a predicted increase in density of small rodents such as deer mice (*Perimyscus maniculatus*) and Gapper's red-backed vole (*Clethrionomys gapperi*) which will generally flourish in the post-logged environment.

One of the effects of forest harvesting in an area of old-growth forest is forest fragmentation, a process which has diverse effects on community and ecosystem integrity. Some of the important changes resulting from habitat fragmentation include:

- increased inter-specific competition for limited browse (prey) and cover
- altered predator:prey ratios
- loss of migration corridors
- increased susceptibility of 'edge' species

Removal of old-growth stands can adversely affect floristic features that depend on these stands for their existence. Non-vascular taxa such as mosses and lichens and structural components such as snags and deadfall have obligate relationships with old stands.

6.3 Wildlife and Fisheries

6.3.1 Ungulates

Of the ungulates found in the study area, only moose (*Alces alces*) are present in significant numbers. Woodland caribou (*Rangifer tarandus*), white-tailed deer (*Odocoileus virginianus*) and mule deer (*O. hemionus*) are sporadically present in the area. Logging, like burning, promotes the growth of herbaceous plants and other ungulate forage. A population increase of ungulates is frequently observed only if adequate thermal and escape cover accompany the emergence of new lush vegetation. Many ungulate species will not try to access forage in the interior of large cut blocks. The barriers created by residual logging slash and debris (tree tops, pushed over non-merchantable stems, blowdown of isolated stems, etc.) can form a nearly impenetrable barrier to moose, especially when it becomes partially buried in snow. The most favourable harvest scenario involves a patchwork of irregular cut-blocks interspersed with uncut spruce stands to provide adequate cover.

McNicol and Timmermann (1981) found that timber harvesting in boreal mixedwood types can enhance the inherent species and age class diversity of these stands. The removal of the mature coniferous component from conifer-dominated stands, while leaving the mature deciduous component and advance coniferous regeneration, results in good moose habitat. This is because 1) canopy openings allow the establishment of important shade-tolerant browse species, 2) residual deciduous components provide immediate age class diversity on the disturbed sites in addition to escape cover and increased edge, and 3) advanced coniferous regeneration in the cutovers provide immediate early winter cover, escape cover and vegetational species diversity.

Although woodland caribou are not abundant in the study area, the importance of cover and lichen forage provided by mature conifer stands is well documented. Information is not available concerning the current migration patterns of caribou herds through the area but loss of this habitat type will adversely affect any possible future movement by caribou in this region.

As stated previously, woodland caribou occur immediately east and southeast of Lesser Slave Lake and are included in the Mitsue Woodland Caribou Herd (Alberta Fish and Wildlife Services 1993). The Mitsue herd is designated as a "Group C" herd in the draft document Strategy for Conservation of Woodland Caribou in Alberta. The Mitsue herd is one of the smaller herds in Alberta (estimated to have fifty animals) and is considered to be located in an area that is vulnerable because of various disturbance factors.

Provincial policy defines woodland caribou as a threatened species and the General Wildlife Regulation of the Alberta Wildlife Act designates woodland caribou as an Endangered Animal.

The Committee On the Status of Endangered Wildlife In Canada (COSEWIC) report on woodland caribou (Kelsall 1985) noted that caribou are not threatened or endangered on a Canada-wide basis. However, some local populations are threatened. COSEWIC does list the western population of woodland caribou as "vulnerable" (Alberta Fish and Wildlife Services 1993).

Active management planning for "Group C" caribou herds such as the Mitsue herd is not proposed in the above draft document. Rather, management agencies will respond to specific land use activities in an attempt to mitigate potential negative impacts on caribou.

Management of caribou will be carried out to reduce risks and maintain the herd as long as possible. Specific options include:

- limit access with timing conditions, road closures and controlled access
- modified timber harvest by selective and partial cutting and extended rotation
- inventory to meet special requirements
- fire control by established priority

6.3.2 Furbearers and Small Mammals

Post-logging environment provides many advantages for small mammals, the most obvious of which is the provision of protective cover from predators in the form of residual logging slash. By removing the overstorey canopy, logging significantly affects local weather conditions. Greater snowpack depth, provided it does not become overly compacted, will improve winter survival of subnivean rodents by moderating temperatures at the ground-snow interface. However, arboreal rodents such as flying squirrel and red squirrel (*Tamiasciurus hudsonicus*) will be negatively affected and will not inhabit cut areas during early or mid-successional stages. Snowshoe hares (*Lepus americanus*) thrive on willow and birch bark in winter and are, therefore, quite abundant after the seral plant species have established themselves in the clearcut areas. Increases in small mammal density in will also lead to a subsequent increase in their predators, especially weasels (F. *Mustelidae*), coyote (*C. lupus*), lynx (*Lynx canadensis*), some hawks (*Accipiter spp*. and *Buteo spp*.), and some owls (F. *Strigidae*).

The study area provides habitat for a number of economically important furbearers including fisher, mink (*Mustela vison*), red fox (*Vulpes vulpes*), wolverine (*Gulo gulo*), beaver (*Castor canadensis*), and other previously mentioned species. Furbearing species that utilize early successional plants such as grasses or shrubs and deciduous hardwoods should be expected to increase while those that rely on old coniferous growth for forage and cover will likely decline after disturbances such as logging. Species expected to thrive in post-disturbance environments include beaver, weasel, coyote, and fox whereas squirrels, marten, and fisher will not. In order to ensure winter survival, beavers require water depths of 0.9 to 1.5 m while muskrat require slightly shallower depths of 0.6 to 0.9 m (Todd 1978). Beavers are dependent on young stands of willow, aspen, or balsam poplar while muskrats are supported by emergent vegetation such as horsetail and bulrush (*Scirpus spp*.) and sedges. The removal of timber along stream courses will reduce habitat quality for mink as this animal spends most of its time within 75 m of water.

Marten and fisher avoid disturbed areas such as clearcuts because of the lack of cover, food and den sites (Environment Council of Alberta 1979). Racey and Hessey (1989) found that there are lower populations in early successional stages than in later ones. Snow cover, depth and texture will vary with stand structure, canopy closure and ambient weather conditions. The more open the area, the more snow and the more restrictions to fisher movement. Soutiere (1979) suggested that a minimum of 25 % of the area be maintained as pole age or older conifer-dominated stands to sustain marten populations.

6.3.3 Avifauna

Bald eagles (*Haliaeetus leucocephalus*) and osprey (*Pandion haliaetus*) occur in the Lesser Slave Lake area and nest in tall trees near large waterbodies. If designated buffer zones are left adjacent to major watercourses, it is conceivable that these birds will remain relatively unaffected by land use activities such as logging operations, access development and recreational and industrial developments. Of the upland game birds present in the area, only the spruce grouse (*Canachites canadensis*) will be significantly affected by forest cover removal due to its reliance on conifer needles as a food source throughout the year. Ruffed and sharp-tailed grouse (*Bonasa umbellus*, *Pedioecetes phasianellus*) occupy cut-over areas almost immediately after logging.

The increase in the amount of habitat edges is also advantageous to ecotone species and unfavourable to species of the forest interior. Helle (1985b) and Hannson (1983) have shown that breeding bird densities increase with the age of the forest and that the species diversity is lower in fragmented forests where edge is high than in forest interiors.

Andren (1992) found that the density of corvids (raven, crows, magpies and jays) increase as forests become fragmented and intermixed with agricultural land. This resulted in increased nest predation in small forest fragments.

Lesser Slave Lake, as well as several smaller lakes to the east of Lesser Slave Lake (Muskeg Lake, Mitsue Lake, several unnamed lakes), provide significant production, rearing and staging habitat for waterfowl as well as numerous other bird species including western grebes, American White pelicans, ring-billed, California and Franklin's gulls and common and black terns (Ealey 1979). Mallards, American widgeons, common goldeneye and lesser scaup were the most abundant duck species recorded during Ealey's 1979 survey. Ducks selected shorelines of sedge and sedge-shrub habitats in preference to wooded shorelines.

High lake water levels that occur fairly frequently at Lesser Slave Lake limit the nesting success of shoreline or island nesting species such as certain gulls and terns. Black terns and Franklin's gulls nest on floating mats of aquatic vegetation and are better able to cope with high water levels.

Increased access and shoreline development are the primary threats to waterfowl and water-dependent avifauna. Water-based activities on lakes, especially the use of power boats, can have a serious impact during the breeding season, the time when most water birds are most sensitive to disturbances.

6.3.4 Fisheries

Poor timber harvesting and road building practices result in increased runoff, streambed scouring, and excessive sedimentation. These changes strongly impact critical life cycle components of fish, including spawning and migration.

Spawning and survival of fish species is dependent on (1) water temperature, (2) availability of dissolved oxygen, (3) adequate forage source, and (4) undisturbed spawning habitat. All of these factors can be affected by various land use activities, but unfortunately, no extensive surveys or limnological studies have been conducted in the area to quantify this affect.

The physical (e.g. clarity) and chemical (e.g. dissolved oxygen) characteristics of water determine its suitability for fish and its ability to sustain life. Changes to the natural landscape may be reflected in the physical and chemical characteristics of the stream.

Vegetation exerts a strong influence by regulating the input of sediment into a stream; it stabilizes the soil through root development, breaks the impact of falling precipitation and enhances infiltration which reduces erosion (Fish and Wildlife 1978). The removal of vegetation increases the potential for erosion and subsequent deposition of sediment into a stream.

The amount of suspended sediment fluctuates with stream discharge. With decreasing discharge, suspended sediments settle out onto the streambed; fish whose eggs are susceptible to the effects of sediment will avoid deposition of eggs or will produce only a few, if any, offspring as the eggs are subject to asphyxiation from settling sediment. Some species are tolerant of some suspended sediment and depend upon it for cover (e.g. goldeye). Areas of low water velocity, which are subject to greatest sediment deposition are often critical rearing, resting and feeding sites. This loss of favourable habitat may ultimately result in fish or other species upon which fish are dependent becoming displaced.

Loss of river and streamside trees will increase the temperature variation of the water (ie. colder at night, warmer during the day). Individuals that are accustomed to cold temperatures usually prefer warm water (Paetz and Nelson 1970). An example is northern pike (*Esox lucius*) which tends to occupy shallow, slow-moving waters. Logging of trees in riparian habitats will alter the ecological process by exposing the lakes to wind. In the absence of wind, a moderately deep lake will have a stratified temperature regime with surface waters being considerably warmer than bottom waters. This stratification allows for different temperature requirements of various fish species to be met. However, if the windbreaking trees are removed and the lake is exposed, the upper layer of warm water is circulated by wind action and the entire lake is of a fairly uniform temperature. Stream temperatures are usually uniform as well.

Introduction of woody debris into water channels will increase the demand for dissolved oxygen. An increase in biological oxygen demand will decrease water oxygen levels, especially during winter when snow cover and cloudy ice eliminates sunlight penetration and prevents algae from adding oxygen to the water during photosynthesis. Oxygen deprivation may result in massive fish die-offs during late winter and, since game species require more oxygen than non-game species, they are usually killed first (Paetz and Nelson 1970).

Terrestrial invertebrates falling from bankside vegetation into tributaries constitute a critical forage source for many boreal fish species. Loss of riparian vegetation will reduce ingress of terrestrial invertebrates into tributaries and, thus, alter local fish populations.

Loss of riparian trees around lakes and streams will increase erosion and siltation. Sedimentation from lakeside soils can promote the succession of oligotrophic and eutrophic lakes to ponds and marshes, thus drastically affecting the aquatic life it supports. Water holding capacity of streamside vegetation will also be reduced and result in a larger volume, but shorter duration, spring run-off. Spawning fish usually take advantage of the spring run-off when meltwater allows them to move upstream over beaver dams. After hatching, fry move downstream over beaver dams to the larger rivers. A short spring run-off period of less than seven weeks may strand fry upstream of beaver dams and significantly increase juvenile mortality.

Culverts present a serious problem for fish movement due to the excessive vertical drop of stream waters at the culvert outlet. These barriers also interfere with spawning migrations to upstream gravel beds.

6.4 Scientific and Cultural Features

6.4.1 Natural Areas

Four designated Natural Areas (Hondo, Saulteaux, Otauwau, Police Point) occur within the study area, as well as two additional Natural Areas Reservations (Mitsue Lake, Otauwau).

Natural Areas are protected public lands set aside with the main objective of maintaining their natural features. Their management emphasizes public appreciation, education, research and/or recreation when this is compatible with the main objective. Natural Areas are by policy divided into three categories: Education, Conservation and Recreation. In many cases, a site may fit into one or more of these. Legislation for Natural Areas is provided in the "Wilderness Areas, Ecological Reserves and Natural Areas Act" (Government of Alberta, 1981).

Natural areas legislation gives general protective status but it does not address site-specific needs of individual natural areas. Consequently, a site specific management plan is required.

These plans are directed at managing users of the natural area. Adherence to the plans will reduce or prevent unacceptable resource and social conditions and rehabilitate certain desirable conditions in the natural area. The plans also establish a process for managing the natural area co-operatively between government and public users.

The Hondo, Saulteaux and Otauwau natural areas are designated by policy as Educational Natural Areas. They have been used since the 1960's for research by the University of Alberta. The intents of the sites are:

- to maintain natural ecological diversity, ecological processes, native species and habitats
- to protect rare and significant natural features
- to protect sites of present and future research projects conducted by the University of Alberta Botany Department and other agencies or institutes
- to facilitate educational use
- to permit a wide range of activities (especially research and recreational) where compatible with the primary intent of protection

6.4.2 Historic Sites

Little site-specific information is available with regard to historic sites in the Lesser Slave Lake area, although the area was known to be an important fur trading centre and transportation route. Arnold (1971) of the Alberta Archaeology Survey, compiled a brief report outlining the results of a historic site survey of fur trade posts in the Lesser Slave Lake area based on records and journals from the Hudson's Bay Company and the North West Company.

The following excerpts are taken from Arnold (1971):

> "*Mirror Landing Houses*
>
> *There may have been two posts at this point where the Lesser Slave River empties into the Athabasca River. During the winter of 1799-1800, Fidler mentions a Canadian House at the mouth of Lesser Slave River. (Many people feel, however, that Fidler is referring to the Canadian House on the south-east shore of Lesser Slave Lake about ½ mile from the head of Lesser Slave River). Then in 1817, William Sinclair of the Hudson's Bay Company built a house on the Athabasca River just below its junction with Lesser Slave River which was in operation for at least one year.*

East Lesser Slave Lake House

The existence of a Canadian post on the south-eastern shore of Lesser Slave Lake is fairly well documented, however, the dates of its operation are not. It was operating during the winter of 1802-03 when Thompson visited this post which he placed about ½ or ¾ mile from the head of Lesser Slave River. It was abandoned by 1816 as Lewis of the H.B. Co. referred to it as the "Old Fort" and again in 1819 as "the NW old house".

Dog Island

Lying about 1½ miles off the south-east shore of Lesser Slave Lake, Dog Island is reported to have been the site of a N.W. Co. fishery during the early 19th Century.

Buffalo Bay Houses

There were at least three posts built by the two companies of Buffalo Bay with warehouses stretching from the mouth of the Heart River to Shaw's Point. One or another of the posts was open (2 year exception), to serve the people of the area from ca. 1802 until ca. 1930.

West Lesser Slave Lake House

Established at least by 1802, the post which Thompson describes as being "situated in a Bay of Rushes in a very bad situation, with a northern aspect" was the main Canadian post in the area until Union in 1821. The post may have been rebuilt in a different location during the course of its history,for after amalgamation of the N.W. Co. and the H.B. Co. the site of this Canadian post was used for the new H.B. Co. fort as the N.W. Co. site was more suitably situated as well as "the more convenient of the two". This site was then occupied until the end of the 1826-27 season when the Lesser Slave Lake district was abandoned in order to recuperate from having been "constantly wrought for a great length of time".

Fort Waterloo

This fort was established by Francois Decoigtne for the H.B. Co. in the fall of 1816 and seized by the N.W. Co. in December of that same year. The H.B. Co. re-established the post in the summer of 1818 and occupied it until amalgamation in 1821 when it was abandoned in favour of the N.W. Co. post.

Lesser Slave Lake Fort

> *A new post at Lesser Slave Lake was established by the H.B. Co. in 1829. the site chosen for the new post was on the river connecting Lesser Slave Lake to Buffalo Bay. It was around this post that the settlement of Grouard was built. The post occupied in 1829 site until the 1926-27 season when the companies' buildings were transferred to a more convenient location where they were subsequently destroyed by fire in 1933."*

Arnold (1971) found that very little, if any, physical evidence remained at the probable locations of the above sites and in most cases, he was unable to pin-point an exact location for the posts or forts.

7.0 DATA GAPS

There is a general lack of detailed natural resource information available for the study area apart from a few biophysical inventories for the north shore area conducted by Alberta Environmental Protection (Schultz et al. 1991, Schultz and Bentz 1993) and an impact assessment study for the Lesser Slave Lake Water Regulation Project (Ealey and Thompson 1979). No biophysical inventory is available for the entire study area. The Alberta Parks Service has conducted several studies on Provincial Park lands (Nordstrom 1979, Bradley 1980, Lombard North Planning Ltd. 1972) but these have been fairly limited in scope and only cover a small portion of the study area.

Data gaps are particularly conspicuous with respect to the distribution of rare plant and animal species. Past efforts to locate rare species have been minimal and the field time allocated for this project was insufficient to conduct an inventory of rare plant and animal species.

Wildlife population surveys conducted by Alberta Fish and Wildlife Services have dealt primarily with game species such as large ungulates and to a lesser extent waterfowl and birds of prey. Surveys of non-game species are almost totally lacking, other than a few published species checklists (Bradley 1980, Ealey 1979). Population status for all but a few wildlife species is largely unknown in the study area.

Although many of the more prominent lakes, rivers and creeks in the study area have been identified as significant ecological features, little detailed data is available documenting the physical and biological characteristics of the waterbodies. Without adequate baseline data it will be very difficult to assess future impacts as resource development and exploitation proceed in the area.

Almost no information is available concerning site-specific historic, prehistoric and paleontological sites in the study area. Arnold (1971) conducted a brief survey of historic sites such as fur-trading posts established during the 1800's, but specific locations of the forts and posts were not established.

There is a pressing need for more detailed inventories of ecological features in the area prior to widespread resource development. Many more sites may exist than are described in this report and detailed field investigations are required to further document the characteristics of the sites identified and determine their sensitivity to various forms of development. Data gaps with a high priority for further study include:

- biophysical inventory of areas not previously included in past north shore surveys
- distribution of rare plant species and communities including remnant old-growth forest stands
- present status and locations of nesting areas for rare or sensitive avifauna species such as the bald eagle and osprey
- location of seasonally important habitats for moose and woodland caribou; available information is inadequate for future land use planning
- current status of fisheries resources of the smaller lakes, rivers and creeks
- characteristics and importance of the numerous large peatlands in the study area

8.0 CHECKLISTS OF SIGNIFICANT ECOLOGICAL FEATURES

Following are descriptions or checklists of each of the significant ecological features identified in the Lesser Slave Lake study area. An overall sensitivity rating is given for each SEF, however, sensitivity ratings for each of 10 different land use activities by SEF category are also provided in Section 5.0 of the report.

SEF checklists are ordered by level of significance, i.e. from national to local significance. Within each significance category, individual SEFs are ordered alphabetically.

Site Name: **ATHABASCA RIVER**

Site Location:

North of Tp. 69 to Smith
- Tp. 70 - Rg. 1 - W5

Description:

- portion of Athabasca River approximately 18 km in length that forms eastern boundary of study area
- important sport fishery (walleye, Arctic grayling, mountain whitefish, northern pike, goldeye, burbot)
- key wildlife movement corridor
- high landform diversity (meanders, islands, point bars)

Significance: **National**

- part of a nationally significant watercourse
- significant fisheries habitat and wildlife movement corridor
- provincially significant moose habitat

Sensitivity: Moderate

Management Considerations:

- land use activities adjacent to tributary rivers and creeks will impact downstream water quality
- on-going monitoring is required to ensure water quality is maintained particularly from watercourses such as the Lesser Slave River which receive effluent from the Weyerhaeuser Canada Ltd. pulp mill

References:

- D.A. Westworth & Associates (1990) - site 487
- Fish and Wildlife Services file material

Site Name: CHISHOLM RIBBED FEN

Site Location:

West of Hondo and east of Delorme Lake
- Tp. 70 - Rg. 2 - W5

Description:

- northern portion of large fen and sand dune complex associated with the Athabasca River
- the peatland is *Larix* dominated and has a reticulate pattern to the ribbing
- portions of the fen are non-patterned
- high diversity of landforms and vegetation communities

Significance: Provincial

- significant hydrological feature that serves as a dominant discharge area draining into the Athabasca River system
- part of the provincially significant Mitsue Caribou Range
- important aquatic furbearer habitat
- recognized as one of the significant ribbed fen peatland areas in the province

Sensitivity: High

Management Considerations:

- access development could potentially impact on local hydrological regimes and groundwater quality

References:

- D.A. Westworth & Associates (1990)
- Nicholson (1991)
- 1993 field reconnaissance

Site Name: **HONDO NATURAL AREA**

Site Location:

6.7 km northwest of the Athabasca River - Highway #2 crossing
- Tp. 70 - Rg. 1 - Sec. N30, 31 - W5M
- Tp. 70 - Rg. 2 - Sec. LSD 8, 9 and 10 of 36, W5M

Description:

- designated as an Educational Natural Area
- used since the 1960's for ecological research by the University of Alberta, Botany Department
- 437 ha in size
- high diversity of landforms including sand dunes and sand ridges, wetlands, black spruce - tamarack fens, patterned sedge fens and small lakes
- high diversity of wildlife species

Significance: **Provincial**

- designated Provincial Natural Area, primarily for scientific research and educational purposes
- representative of a diversity of Boreal Mixedwood vegetation communities and landform types

Sensitivity: Moderate to High

Management Considerations:

- Natural Areas are protected public lands set aside with the main objective of maintaining their natural features
- management emphasizes public appreciation, education, research and/or recreation
- land use activities are controlled by provincial legislation under the Wilderness Areas, Ecological Reserves and Natural Areas Act and as described in the Hondo Natural Area Management Plan

References:

- Natural and Protected Areas files
- Hondo Natural Area Management Plan

Site Name: **LESSER SLAVE LAKE HORIZONTAL FEN**

Site Location:

East of Slave Lake and north of Lesser Slave River
- Tp. 73 - Rg. 3-5 - W5

Description:

- provincially recognized large, moderately rich horizontal fen
- contains a variety of peatland types - open non-patterned fens, forested fens and *Sphagnum* peat plateaus
- vegetation cover primarily black spruce-tamarack and tamarack-dominated fens

Significance: **Provincial**

- significant hydrological feature east of Lesser Slave Lake that serves as a major discharge basin for groundwater originating in the Pelican Mountains to the north
- part of the provincially significant Mitsue Caribou Range
- important aquatic furbearer habitat

Sensitivity: Moderate to High

Management Considerations:

- extensive access and wellsite development by the oil and gas industry could potentially impact local hydrological regimes and groundwater quality

Reference:

- Chee and Vitt (1989)
- Nicholson (1991)
- D.A. Westworth & Associates (1991)
- Alberta Fish and Wildlife Division (1989)

Site Name: LESSER SLAVE LAKE - NORTH SHORE

Site Location:

Shoreline along north shore
- Tp. 76 - Rg. 7-14 - W5

Description:

- shoreline area along north shore of Lesser Slave Lake approximately 400m wide corresponding to Protective Notation disposition help by Alberta Parks Service
- includes foreshore and backshore areas consisting of emergent vegetation, beach materials and forested backshore
- high diversity of vegetation communities including aquatic emergents, willow shrubland, deciduous and mixedwood forest and black spruce-tamarack fens
- 189 species of birds expected to occur in the Lesser Slave Lake area - 57% of the entire Alberta avifauna; 47 species of mammals; 2 species of reptiles and 5 species of amphibians
- helicopter survey of north shore in August 1993 resulted in observations of 32 Bald Eagles (11 immature and 21 adult), 41 American White Pelicans, 1 Great Blue Heron, 3 Sandhill Cranes, 14 Northern Harrier Hawks, and 1 Red-tailed Hawk
- littoral zone provides critical spawning and rearing habitat for northern pike, yellow perch, lake whitefish and walleye
- historic "Grouard Trail" located along portions of north shore

Significance: Provincial

- provincially significant bald eagle nesting and foraging habitat
- important waterfowl production and staging habitat, particularly west of the Narrows; mallards and American widgeon most common species
- important shorebird nesting and foraging habitat
- 21 species of raptors occur in the Lesser Slave Lake area
- significant concentrations and/or breeding colonies of western grebes; ring-billed, California and Franklin's gulls; common and black terns
- littoral zone critical spawning habitat for northern pike, yellow perch, lake whitefish
- walleye rearing and spawning habitat in west bay of lake

Sensitivity: Moderate

Management Considerations:

- access and shoreline development limited to date
- future development should consider significant wildlife habitat values along shoreline

References:

- Alberta Parks Service, unpublished
- Ealey (1979)
- Doberstein (1978)
- Fish and Wildlife Services, unpublished
- 1993 field reconnaissance
- Schultz and Bentz (1993)

Site Name: LESSER SLAVE RIVER - WEST REACH

Site Location:

East of Lesser Slave Lake to confluence of Saulteaux River
- Tp. 71-73 - Rg. 1-5 - W5

Description:

- only outlet of Lesser Slave Lake flowing east into the Athabasca River at Smith
- meandering channel in a relatively wide valley
- well developed fluvial landforms including large fluvial terraces and oxbow lakes
- diverse floodplain vegetation communities including old-growth mixedwood forest and willow shrubland
- important fisheries habitat including significant sport fishery for northern pike, walleye and goldeye; other fish present include lake whitefish, yellow perch, Arctic grayling and suckers; northern pike spawning habitat occurs in backwater channels closer to Lesser Slave Lake
- channel fairly deep with relatively low gradient
- water level regulation of Lesser Slave Lake by Alberta Environment initiated in 1980 on the Lesser Slave River and included eight meander "cut-offs" in the upper 24 km of the river and a fixed crest weir and a fish way to allow fish to migrate into the lake

Significance: Provincial

- significant hydrological feature
- important wildlife movement corridor
- significant fisheries habitat
- significant bald eagle nesting and foraging habitat
- important recreational watercourse

Sensitivity: Moderate

Management Considerations:

- private agricultural lands north of river are a potential source of pollutants
- weir at western end of river acts as a the major water level control structure for Lesser Slave Lake
- waste water effluent from Weyerhaeuser Canada Ltd. pulp mill is discharged into the river; monitoring of water quality conducted by Weyerhaeuser and Environmental Protection

References:

- 1993 field reconnaissance
- Schultz and Bentz (1993)

- Ealey (1979)
- Alberta Environmental Protection, Planning Division (1993)
- Fish and Wildlife Services, unpublished

Site Name: **LESSER SLAVE RIVER - EAST REACH**

Site Location:

Saulteaux River confluence to Athabasca River confluence
- Tp. 72 - Rg. 1-2 - W5

Description:

- only outlet of Lesser Slave Lake flowing east into Athabasca River at Smith
- wide meandering channel in relatively wide valley
- well developed fluvial landforms including large fluvial terraces; east reach has a faster gradient than west reach with numerous riffle sections
- important sport fishery for walleye, mountain whitefish, northern pike, goldeye and suckers
- mountain whitefish spawning suspected

Significance: **Provincial**

- important sport fishery; high fisheries diversity; key northern pike spawning area; suspected mountain whitefish spawning
- key moose habitat
- important wildlife movement corridor
- significant bald eagle nesting and foraging habitat
- significant hydrologic feature
- important recreational watercourse
- important aquatic furbearer habitat

Sensitivity: Moderate

Management Considerations:

- private agricultural lands north of river are a potential source of pollutants from agricultural chemicals and livestock

References:

- D.A. Westworth & Associates (1990) - site 489
- Schultz and Bentz (1993)
- Fish and Wildlife Services, unpublished

Site Name: **MARTEN MOUNTAIN**

Site Location:

East of Lesser Slave Lake
- Tp. 75 - Rg. 5 - W5

Description:

- part of Pelican Mountains which are the eastern-most foothills outlier in the province
- rolling to hilly topography with elevations ranging from 760 m to 1020 m; highest point of land in the study area
- capped by late Tertiary unconsolidated sands and preglacial gravels
- unique vegetation communities including disjunct populations of lodgepole pine, devil's club and dwarf bramble
- extensive peatland complex included in the area composed of floating and patterned fens and treed horizontal fens

Significance: **Provincial**

- unique landform feature in the province
- high diversity of landforms and vegetation communities
- old-growth mixedwood forest supports a unique assemblage of wildlife species in the region

Sensitivity: Moderate

Management Considerations:

- resource and access development limited to date
- steep side-slopes are sensitive to soil disturbance

References:

- Bradley (1980)
- Natural and Protected Areas files
- D.A. Westworth & Associates Ltd. (1990)

Site Name: **MITSUE WOODLAND CARIBOU RANGE**

Site Location:

East of Saulteaux River to Athabasca River
- Tp. 71 - Rg. 2 - W5

Description:

- provincially recognized key caribou range
- estimated 1993 caribou population size is 50 animals
- includes numerous lakes, large ribbed fens and extensive horizontal fens
- productive furbearer habitat

Significance: **Provincial**

- provincially recognized woodland caribou range
- high diversity of peatland types

Sensitivity: High

Management Considerations:

- harvesting of old growth coniferous forest will reduce carrying capacity for caribou
- resource exploration and access development will reduce habitat quality through fragmentation and disruption of traditional movement corridors
- identified by Fish and Wildlife Services as a lower priority caribou herd (Group C) in terms of special management planning in the draft report "Strategy for Conservation of Woodland Caribou in Alberta"

References:

- D.A. Westworth & Associates Ltd. (1990) - Site 612
- Fish and Wildlife Division (1989)
- Fish and Wildlife Services (1993)
- 1993 field reconnaissance

Site Name: NORTH SHORE MOOSE AREA

Site Location:

North shore of Lesser Slave Lake
- Tp. 75 - 76 - Rg. 7 - 13 - W5

Description:

- provincially recognized key moose habitat
- high diversity of vegetation communities including aspen-balsam popular, aspen-white spruce, black spruce-tamarack fens, tamarack-dominated patterned fens, sedge fens and willow-sedge wetlands
- extensive beaver activity has created numerous small lakes and ponds along stream channels

Significance: Provincial

- provincially recognized key moose habitat
- provincially recognized bald eagle nesting and foraging habitat
- one of the most productive fisher habitat areas in the province
- one of the better coyote production areas in the province
- highly productive beaver, muskrat and red squirrel habitat

Sensitivity: Moderate

Management Considerations:

- timber harvesting and oil and gas activities should conform to provincial guidelines
- habitat destruction and fragmentation for "old-growth" dependent species should be considered during resource development activities

Reference:

- Alberta Fish and Wildlife Division (1989)
- Ealey (1979)
- Schultz and Bentz (1992)
- Nietfeld et al. (1984)
- Boyd (1977)

Site Name: OTAUWAU NATURAL AREA

Site Location:

Approximately 3 km east of Otauwau River along Highway #2
- Tp. 71 - Rg. 3 - Sec. S26, N23 - W5

Description:

- designated as an Educational Natural Area
- used since the 1960's for ecological research and education by the University of Alberta, Botany Department

Significance: Provincial

- designated Provincial Natural Area primarily for scientific and education criteria
- representative of a variety of Boreal Mixedwood vegetation communities

Sensitivity: Moderate to High

Management Considerations:

- Natural Areas are protected public lands set aside with the main objective of maintaining their natural features
- management emphasizes public appreciation, education, research and/or recreation
- land use activities are controlled by provincial legislation under the Wilderness Areas, Ecological Reserves and Natural Areas Act and as described in the Otauwau Natural Area Management Plan

References:

- Natural and Protected Areas files
- Otauwau Natural Area Management Plan

Site Name: **POLICE POINT NATURAL AREA**

Site location:

East shore of Buffalo Bay and north of Grouard Mission
- Tp. 76 - Rg. 14 - Sec. 5, 6, 8 - W5

Description:

- 310 ha in size
- portion of the historical Grouard Trail runs through the Natural Area
- site is surrounded by extensive marshlands and incorporates a large variety of community types including mixedwood forest, black spruce bogs and fens and willow swamps
- over 100 species of nesting birds recorded

Significance: **Provincial**

- designated Natural Area
- significant historical and ecological features
- significant wildlife habitat

Sensitivity: Moderate to High

Management Considerations:

- Natural Areas are protected public lands set aside with the main objective of maintaining their natural features
- management emphasizes public appreciation, education, research and/or recreation
- land use activities are controlled by provincial legislation under the Wilderness Areas, Ecological Reserves and Natural Areas Act and as described in the Police Point Natural Area Management Plan
- provincial legislation ensures the preservation of the Natural Area

References:

- Natural and Protected Areas files
- Police Point Natural Area Management Plan

Site Name: SAULTEAUX NATURAL AREA

Site Location:

10 km northwest of the Athabasca River - Highway #2 crossing
- Tp. 71 - Rg. 2 - Sec. W14, E15 - W5

Description:

- designated as an Educational Natural Area
- used since the 1960's for ecological research and education by the University of Alberta, Botany Department
- 289 ha in size
- recognized for its valuable educational potential due to a high diversity of ecosystems present in a relatively small area
- a variety of successional stages and vegetation communities are present which provide excellent educational opportunities

Significance: Provincial

- designated Provincial Natural Area primarily for scientific research and educational purposes
- representative of a diversity of Boreal Mixedwood vegetation communities

Sensitivity: Moderate to High

Management Considerations:

- Natural Areas are protected public lands set aside with the main objective of maintaining their natural features
- management emphasizes public appreciation, education, research and/or recreation
- land use activities are controlled by provincial legislation under the Wilderness Areas, Ecological Reserves and Natural Areas Act and as described in the Saulteaux Natural Area Management Plan

References:

- Natural and Protected Areas files
- Saulteaux Natural Area Management Plan

Site Name: FLAT TOP MOOSE AREA

Site Location:

South of Town of Slave Lake in area of Flat Top Lookout
- Tp. 71-72 - Rg. 4-6 - W5

Description:

- provincially recognized key moose habitat
- includes mid reaches of Otauwau River (south of Highway #2), uplands of the Flat Top plateau and mid-reaches of Sawridge Creek
- diverse vegetation communities including upland aspen and aspen-white spruce forest, black spruce-tamarack fens and riparian spruce, willow and sedge communities
- portion of area included in Swan Hills outlier component of Lower Boreal - Cordilleran Ecoregion
- Flat Top Plateau one of the highest points in the study area
- productive furbearer habitat

Significance: Regional

- provincially recognized key moose range
- high landform and vegetation diversity

Sensitivity: Moderate

Management Considerations:

- resource development and access development will potentially reduce habitat quality through fragmentation and disruption of traditional movement corridors

References:

- Alberta Fish and Wildlife Division (1989)
- 1993 field reconnaissance

Site Name: **LESSER SLAVE LAKE SOUTHEAST SHORELINE**

Site Location:

East of Nine Mile Point to Mooney Creek
- Tp. 73 - Rg. 6 - W5

Description:

- foreshore and backshore areas north of Highway #2 along the southeast shoreline of Lesser Slave Lake including the mouth of Mooney Creek and the shoreline area of the Sawridge Indian Reserve
- extensive aquatic emergent vegetation along foreshore and a complex of willow shrubland and sedge/grass on backshore beach deposits, grading into mixedwood forest on the uplands to the south
- observations during 1993 field reconnaissance included approximately 2000 ducks and gulls, 20 pelicans and 15 Canada geese

Significance: **Regional**

- significant waterfowl and colonial nesting avifauna staging and foraging area
- important waterfowl production area
- littoral zone key northern pike, yellow perch and burbot spawning and rearing habitat

Sensitivity: Moderate to High

Management Considerations:

- maintenance of shoreline and littoral vegetation critical for waterfowl and fisheries habitat
- upstream land use adjacent to Mooney Creek may potentially impact water quality in the southeast bay of Lesser Slave Lake

References:

- 1993 field reconnaissance
- Ealey (1979)
- Fish and Wildlife Services, unpublished

Site Name: LILY LAKE

Site Location:

Northeast of Marten Mountain lookout
- Tp. 75 - Rg. 5 - W5

Description:

- small lake situated near the summit of Marten Mountain on the eastern fringe of Lesser Slave Lake Provincial Park
- drained by Lily Creek
- recreational eastern brook trout fishery (summer and winter); stocked on alternate years with 4000 brook trout fingerlings

Significance: Regional

- important hydrological feature
- local recreational feature for hikers and nature enthusiasts
- old-growth mixedwood forest in adjacent uplands
- local sport fishery

Sensitivity: Moderate

Management Considerations:

- small lake suitable for limited, low-impact recreational activities such as hiking, fishing and nature observation
- existing hiking trail to lake originating from Marten Mountain forestry lookout

References:

- 1993 field reconnaissance
- Fish and Wildlife Services, unpublished

Site Name: MARTEN CREEK

Site Location:

Northeast shore of Lesser Slave Lake
- Tp. 75-76 - Rg. 4-6 - W5

Description:

- underfit stream that meanders through a relatively wide preglacial buried valley
- steep, forested valley sides and wide valley bottom with high diversity of vegetation communities consisting of old-growth mixedwood and coniferous forest, sedge meadows and willow shrubland
- headwaters originate from Marten Mountain and Marten Lakes
- Arctic grayling fishery and suspected walleye spawning in lower reaches

Significance: Regional

- significant hydrological and geomorphological feature along north shore
- important wildlife movement corridor
- old-growth forest on fluvial deposits
- important sport fishery

Sensitivity: Moderate

Management Considerations:

- lower reach of creek flows through Lesser Slave Lake Provincial Park
- steep valley slopes susceptible

References:

- Bradley (1980)
- Schultz and Bentz (1993)
- 1993 field reconnaissance
- Fish and Wildlife Services, unpublished

Site Name: **MARTEN LAKES**

Site Location:

Northeast of Marten Mountain
- Tp. 76 - Rg. 4-5 - W5

Description:

- series of three small lakes in a relatively steep-sided, deep, glacial meltwater spillway
- the two easterly lakes are drained by the Willow River and the westerly lake is drained by Marten Creek
- adjacent uplands are primarily well-drained with mature mixedwood forest cover; willow shrubland and sedge meadow wetlands occur in the valley bottom between the lakes
- middle and east lakes commercially fished occasionally for lake whitefish (450 kg quota); east lake last fished in 1983 (28 kg harvest - all species); middle lake last fished in 1981 (302 kg harvest - all species); recreational fishery is limited because of poor access but fish present include northern pike, lake whitefish and burbot

Significance: **Regional**

- significant hydrological feature
- minor waterfowl use of lakes
- commercial fishery and potential sport fishery

Sensitivity: Moderate

Management Considerations:

- access development and resource development in adjacent areas limited to date
- no recreation development at lakes to date because of poor access but limited potential exists

References:

- 1993 field reconnaissance
- Schultz and Bentz (1993)
- Fish and Wildlife Services, unpublished

Site Name: MITSUE LAKE

Site Location:

6.5 km east of the Town of Slave Lake
- Tp. 72 - Rg. 4-5 - W5

Description:

- largest lake in study area other than Lesser Slave Lake
- relatively shallow lake with extensive areas of emergent aquatic vegetation along portions of shoreline
- surrounding terrain primarily muskeg or young deciduous upland forest
- mid-August 1993 aerial reconnaissance survey observations included approximately 1000 ducks, 15 Canada geese and one adult and one juvenile bald eagle

Significance: Regional

- provincially recognized waterfowl production and staging habitat
- significant fisheries habitat, particularly for northern pike and yellow perch
- important local recreational resource
- used as a foraging lake for local bald eagle population

Sensitivity: Moderate

Management Considerations:

- extensive access development surrounding lake for oil and gas and forest industry development could impact water quality
- major forest industry developments on north shore of lake include Weyerhaeuser Canada Ltd. pulp mill, Zeidler Forest Industries Ltd. sawmill, Vanderwell Contractors Ltd. sawmill and Chevron gas plant
- Chevron gas plant draws cooling water from Mitsue Lake and discharges warm water back into the lake which creates a thermal impact on lake water
- on-going monitoring done by Environmental Protection, Water Resources and Fish and Wildlife Services when specific problems are reported

References:

- 1993 field reconnaissance
- Fish and Wildlife Division (1989) and unpublished

Site Name: MITSUE LAKE NATURAL AREA RESERVATION

Site Location:

Approximately 2.3 km southeast of the West Mitsue Lake Road and 6.5 km northwest of the East Mitsue Lake Road.
- Tp. 72 - Rg. 5 - Sec. S14, N11 - W5

Description:

- important University of Alberta research area
- high diversity of flora and fauna characteristic of mature boreal mixedwood forest
- both upland mixedwood forest and peatland vegetation types represented

Significance: Regional

- potential Natural Area currently under reservation but not designated under the Natural Areas Act
- representative of a diversity of Boreal Mixedwood vegetation communities

Sensitivity: Moderate to High

Management Considerations:

- Natural Areas are protected public lands set aside with the main objective of maintaining their natural features
- management emphasizes public appreciation, education, research and/or recreation
- land use activities are controlled by provincial legislation under the Wilderness Areas, Ecological Reserves and Natural Areas Act

References:

- Natural and Protected Areas files

Site Name: MOONEY CREEK

Site Location:

West of the Town of Slave Lake
- Tp. 72-73 - Rg. 6 - W5

Description:

- small creek with headwaters in the Frost Hills and draining into Lesser Slave Lake; only the lower reaches located within the study area
- meandering and sinuous channel flowing in a wide shallow valley
- vegetation on adjacent uplands primarily mature deciduous and mixedwood forest
- fisheries resource includes Arctic grayling and suckers

Significance: Regional

- important hydrological feature
- important wildlife movement corridor
- important fisheries habitat for Arctic grayling and suckers

Sensitivity: Moderate

Management Considerations:

- limited access development for resource exploitation in adjacent areas
- agricultural development adjacent to channel may impact water quality

References:

- 1993 field reconnaissance
- Fish and Wildlife Services, unpublished

Site Name: **MUSKEG CREEK**

Site Location:

South slopes of Marten Mountain
- Tp. 73-75 - Rg. 4-5 - W5

Description:

- significant subwatershed draining the south slope of Marten Mountain
- headwaters originate in Marten Mountain and flow into large peatland basin east of Lesser Slave Lake; channel becomes dispersed within the large peatland complex but several channels form to the south and eventually drain into Lesser Slave River
- headwater reaches within the Marten Mountains have relatively steep gradients, sinuous channels and V-shaped valleys with mixedwood and coniferous forest cover
- lower reaches have weak gradients and flow through an extensive peatland area
- lower reaches provide important northern pike spawning habitat

Significance: **Regional**

- significant hydrological feature
- important wildlife corridor
- old-growth mixedwood and coniferous forest in upper reaches
- important fisheries spawning habitat

Sensitivity: Moderate

Management Considerations:

- headwater portions of the watershed in the Marten Mountains have steep slopes with high erosion potential, aerial photos indicate evidence of slumping
- oil and gas activities are extensive in lower reaches of the watershed creating a potential for oil spills and pollution of water courses

References:

- 1993 field reconnaissance
- Fish and Wildlife Services, unpublished

2

Site Name: MUSKEG LAKE

Site Location:

Northeast (approximately 3 km) of Town of Slave Lake
- Tp. 73 - Rg. 5 - Sec. 15 - W5

Description:

- two moderately sized, shallow water bodies to the east of Lesser Slave Lake
- surrounding land primarily black spruce-tamarack horizontal fen peatland
- flock or 700 lesser scaup recorded by Ealey (1979)
- approximately 2000 waterfowl recorded on north Muskeg Lake survey in August, 1993 consisting of goldeneye, mallards, lesser scaup and blue-winged teal
- approximately 200 ducks recorded on south Muskeg Lake
- appears south Muskeg Lake primarily a waterfowl production (nesting, brood rearing) lake

Significance: Regional

- important hydrological feature
- significant waterfowl production and staging habitat
- osprey pair observed on lakeshore but nest location unconfirmed
- bald Eagle observed in area

Sensitivity: Moderate

Management Considerations:

- oil and gas activities in vicinity should be monitored to prevent any adverse impacts to local hydrology and lake ecology

References:

- Ealey (1979)
- 1993 field reconnaissance

Site Name: **NARROWS CREEK PEATLAND COMPLEX**

Site Location:

North shore in vicinity of Narrows Creek
- Tp. 75-76 - Sec. 8-10 - W5

Description:

- extensive peatland deposits in a large basin extending northeast from the Big Point area adjacent to Narrows Creek
- high diversity of peatland types including tamarack dominated ribbed fens, sedge fens, black spruce-tamarack bogs and willow-sedge wetlands

Significance: **Regional**

- significant hydrological feature along north shore that serves as a dominant discharge area draining southwards into Lesser Slave Lake
- peatland area forms a significant component of the North Shore Key Moose Range
- important aquatic furbearer habitat
- high diversity of landforms and vegetation

Sensitivity: Moderate to High

Management Considerations:

- access development for timber harvesting and oil and gas activities could impact on the local hydrological regime

References:

- 1993 field reconnaissance
- Schultz and Bentz (1993)

Site Name: **NORTH NARROWS CREEK OLD GROWTH FOREST**

Site Location:

North of The Narrows
- Tp. 76 - Rg. 9 - W5

Description:

- remnant old-growth (in excess of 120 years) coniferous and mixedwood forest stands in upland area north of Narrows Creek
- forest cover primarily white spruce with remnant, decadent balsam poplar and aspen, with understory of balsam fir and white spruce; some sites have significant component of jackpine in overstory
- ground cover primarily prickly rose (*Rosa acicularis*), bracted honeysuckle (*Lonicera involucrata*), bunchberry (*Cornus canadensis*), twinflower (*Linnaea borealis*), and feathermoss

Significance: **Regional**

- remnant old-growth mixedwood and coniferous forest
- important habitat for old-growth dependent wildlife species

Sensitivity: High

Management Considerations:

- active timber harvesting in the vicinity has already removed a significant component of the old-growth and mature forest stands

References:

- Schultz and Bentz (1993)
- 1993 field reconnaissance

Site Name: OTAUWAU RIVER

Site Location:

South of Lesser Slave River
- Tp. 71-72 - Rg. 3-5 - W5

Description:

- major subwatershed draining the northern slopes of the Swan Hills and flowing through the southern portion of the study area into the Lesser Slave River
- meandering channel in relatively wide valley
- diverse floodplain vegetation communities including old-growth riparian mixedwood forest, willow shrubland and sedge/grass meadows
- unique landform features include oxbow lakes, meanders and fluvial terraces
- fish species occurring in the river include northern pike, Arctic grayling and suckers
- Arctic grayling spawning in upper reaches

Significance: Regional

- significant hydrological feature
- included as part of Flat Top Key Moose range
- diverse vegetation communities
- important aquatic furbearer habitat
- important fisheries habitat

Sensitivity: Moderate

Management Considerations:

- channel crossings and adjacent access development should conform to provincial operating ground rules to minimize point-source erosion problems

References:

- 1993 field reconnaissance
- Fish and Wildlife Services, unpublished

Site Name: OTAUWAU RIVER NATURAL AREA RESERVATION

Site Location:

30 km southeast of the Town of Slave Lake
- Tp. 72 - Rg. 3 - Sec. 3 & LSD's 8 & 9 of 4

Description:

- selected by the University of Alberta, Department of Botany, as a research site
- high diversity of landforms and vegetation communities including mature coniferous forests and wetlands

Significance: Regional

- potential Natural Area currently under reservation but not designated under the Natural Areas Act
- representative of a diversity of Boreal Mixedwood vegetation communities

Sensitivity: Moderate to High

Management Considerations:

- Natural Areas are protected public lands set aside with the main objective of maintaining their natural features
- management emphasizes public appreciation, education, research and/or recreation
- land use activities are controlled by provincial legislation under the Wilderness Areas, Ecological Reserves and Natural Areas Act

References:

- Natural and Protected Areas files

Site Name: **SAULTEAUX RIVER**

Site Location:

North from Tp. 70 to confluence with Lesser Slave River
- Tp. 71 - Rg. 2 - W5

Description:

- major subwatershed draining the northern slopes of the Swan Hills and flowing through the southern portion of the study area and draining into the Lesser Slave River
- highly meandering channel in a relatively wide valley with a variety of fluvial landform features including oxbow lakes, meander scars and fluvial terraces
- diverse floodplain vegetation communities including old-growth riparian mixedwood forest, willow shrubland and sedge/grass meadows
- sport fishery for walleye, northern pike and suckers
- Arctic grayling occur in upper reaches and spawn in headwater tributaries

Significance: **Regional**

- significant hydrological feature
- important sportfishery
- included within the provincially recognized Mitsue Caribou Range
- high diversity of fluvial landform features
- important aquatic furbearer habitat

Sensitivity: Moderate

Management Considerations:

- channel crossing and adjacent access development should conform to provincial operating ground rules to minimize point-source erosion problems

References:

- D.A. Westworth & Associates (1990) - site 505
- Schultz and Bentz (1993)
- 1993 field reconnaissance

Site Name: **SAWRIDGE CREEK**

Site Location:

South of Town of Slave Lake
- Tp. 71-72 - Rg. 5-6 - W5

Description:

- significant watercourse flowing through the southern portion of the study area with headwaters in the northern slopes of the Swan Hills and draining into the Lesser Slave River
- sinuous to meandering channel flowing in a wide U-shaped valley south of Highway #2; north of Highway #2, terrain is flatter, channel becomes distinctly meandering and valley is indistinct and shallow
- higher gradient in upper reaches has resulted in extensive gravel bars and course textured channel materials
- mature mixedwood forest vegetation in valley and adjacent uplands; Arctic grayling spawning occurs in headwater reaches

Significance: **Regional**

- significant hydrological feature
- key wildlife movement corridor
- included within the Flat Top Key Moose Range
- Arctic grayling spawning habitat

Sensitivity: Moderate

Management Considerations:

- access development for resource exploitation in adjacent areas fairly limited to date
- lower reach flows through the Town of Slave Lake so water quality is a critical concern; monitoring of future upstream land uses very important
- high gradient of upper reaches creates flooding problems in Town of Slave Lake during spring snowmelt and high intensity rainfall events

References:

- 1993 field reconnaissance
- Fish and Wildlife Services, unpublished

Site Name: SOUTHEAST BEACH RIDGE - PEATLAND COMPLEX

Site Location:

North of Lesser Slave River and south and east of Lesser Slave Lake Provincial Park
- Tp. 73 - Rg. 5 - W5

Description:

- area consists of a complex of old beach ridges, stabilized and active sand dunes, muskeg and several small unnamed lakes (Lakes 16, 17, and 18)
- stabilized sand dunes and beach ridges have jackpine tree cover
- mid-August, 1993 aerial reconnaissance of lakes recorded observations of 250+ ducks, beaver lodges, one adult bald eagle and a moose cow and calf

Significance: Regional

- unique landforms consisting of historic beach ridges and eolian deposits
- wetland and eolian landforms create unique assemblage of plant species
- high landform diversity creates unique wildlife habitat
- important waterfowl production and staging habitat

Sensitivity: High

Management Considerations:

- disturbances to stabilized eolian dunes will promote wind erosion and movement of sand material
- area vegetation very sensitive to trampling and excessive foot traffic
- critical to minimize any additional oil and gas access and development in area since substantial disturbance already exists

References:

- Lombard North Planning Ltd. (1972)
- 1993 field reconnaissance

Site Name: **UNNAMED CREEK (locally Oilman's Creek)**

Site Location:

West of Marten Creek along north shore
- Tp. 75-76 - Rg. 6-7 - W5

Description:

- unnamed creek (locally known as Oilman's Creek) draining the eastern portion of the north shore
- sinuous to meandering channel with narrow forested floodplain in lower reaches and extensive peatland terrain to the north
- beaver damming prominent in upper reaches
- Arctic grayling spawning habitat in upper reaches

Significance: **Regional**

- significant hydrological feature along north shore
- significant aquatic furbearer habitat
- watershed provides key moose habitat
- spawning habitat for Arctic grayling

Sensitivity: Moderate

Management Considerations:

- resource development activity in adjacent areas limited to date

References:

- Fish and Wildlife Services, unpublished
- 1993 field reconnaissance

Site Name: **UNNAMED LAKES-SAULTEAUX PEATLAND LAKE COMPLEX**

Site Location:

East of the Saulteaux River and west of the Athabasca River
- Tp. 70-71 - Rg. 1-2 - W5

Description:

- a complex of 14 unnamed small lakes located east of the Saulteaux River
- surrounding terrain primarily a diverse complex of organic deposits and patches of upland mixedwood forest
- organic deposits consist of northern portion of the Chisholm Ribbed Fen and a variety of horizontal fen and black spruce bog components
- lakes are generally shallow with extensive emergent aquatic vegetation (primarily sedges and bulrush) around perimeters and generally dense beds of yellow water lily (*Naplar variegatum*) and pondweed (*Potamogeton spp.*)
- waterfowl presence noted in all lakes during aerial reconnaissance in mid-August, 1993; the largest lake, #23, had in excess of 200 ducks while several of the smallest lakes had only one or two broods
- surrounding area includes the Saulteaux and Hondo Natural Areas
- lakes are included within the provincially significant Mitsue Caribou Range

Significance: **Regional**

- important hydrological features
- important waterfowl production and staging areas
- important aquatic furbearer habitat
- significant woodland caribou range
- high vegetation diversity

Sensitivity: Moderate

Management Considerations:

- access development in area is still fairly limited but increased activity may impact on local hydrological regimes

References:

- 1993 field reconnaissance
- Fish and Wildlife Key Wildlife Area Maps (1989)

Site Name: **WILLOW RIVER**

Site Location:

East of Marten Lakes
- Tp. 75-76 - Rg. 4 - W5

Description:

- headwater reaches of Willow River flowing north, including eastern Marten Lakes and Marten Mountain
- extensive sedge meadow and shrubland vegetation communities
- Arctic grayling spawning in upper reaches
- walleye occur in lower reaches and spawn near mouth (north of study area)

Significance: **Regional**

- important hydrological feature
- important wildlife habitat
- important sport fishery

Sensitivity: Moderate

Management Considerations:

- access development limited to date in adjacent areas

References:

- 1993 field reconnaissance
- Fish and Wildlife Services, unpublished

Site Name: **ASSINEAU RIVER POINT (WILLOW POINT)**

Site Location:

South shore of Lesser Slave Lake and east of Assineau River
- Tp. 74 - Rg. 8 - W5

Description:

- deltaic deposit east of the lower reach of the Assineau River along the south shore of Lesser Slave Lake
- backshore vegetation composed of a complex of dense willow shrubland and sedge/grass meadow
- extensive aquatic emergent vegetation along shoreline
- important pelican foraging area

Significance: **Local**

- significant waterfowl and shorebird production and staging area along south shore of Lesser Slave Lake
- important American white pelican staging and foraging area

Sensitivity: High

Management Considerations:

- aquatic vegetation sensitive to water level fluctuations of Lesser Slave Lake
- water quality and sediment loads in the Assineau River will impact habitat quality

References:

- Ealey (1979)
- 1993 field reconnaissance

Site Name: CABIN CREEK

Site Location:

Along north shore and south of Highway 754
- Tp. 75-76 - Rg. 5-6 - W5

Description:

- underfit creek in relatively large glacial meltwater channel
- relatively wide valley bottom with extensive sedge meadow and willow shrubland communities
- drains into Marten Creek
- fisheries potential unknown but likely has Arctic grayling

Significance: Local

- significant hydrological and geomorphological feature along north shore
- significant beaver and aquatic furbearer habitat
- important wildlife movement corridor

Sensitivity: Moderate

Management Considerations:

- Highway #754 located immediately to the north of Cabin Creek; increases potential of point source erosion and sedimentation

References:

- 1993 field reconnaissance
- Fish and Wildlife Services, unpublished

Site Name: **EATING CREEK**

Site Location:

Southeast of Mitsue Lake
- Tp. 71-72 - Rg. 5 - W5

Description:

- small creek draining into Lesser Slave River with headwaters on the north slopes of the Flat Top plateau
- sinuous channel flowing in a narrow V-shaped valley in upper reaches, becoming more meandering in a wider valley in lower reaches
- drains into the Lesser Slave River to the northwest of Mitsue Lake
- vegetation cover primarily young deciduous forest in upper watershed, mixedwood forest in middle reaches and black spruce- tamarack fen in lower reaches

Significance: **Local**

- important hydrological feature
- important wildlife movement corridor
- headwater reaches included within the Flat Top Key Moose Range
- likely Arctic grayling spawning in upper reaches

Sensitivity: Moderate

Management Considerations:

- adjacent land uses include oil and gas activities and limited forest harvesting
- access development in watershed not extensive to date except in area south of Highway #2 where some adjacent agricultural development also occurs; effects on water quality should be monitored

References:

- 1993 field reconnaissance
- Fish and Wildlife Services, unpublished

Site Name: FLORIDA CREEK

Site Location:

South of Mitsue Lake
- Tp. 71-72 - Rg. 5 - W5

Description:

- small creek flowing into Mitsue Lake with headwaters in the northeast slopes of the Flat Top plateau area
- sinuous channel becoming more meandering in lower reaches
- one of the primary inlets to Mitsue Lake
- channel primarily in a narrow V-shaped valley becoming broader closer to Mitsue Lake
- vegetation cover primarily mixedwood forest within upper watershed area with significant peatland vegetation of black spruce and black spruce-tamarack in lower reaches

Significance: Local

- important hydrological feature
- important wildlife movement corridor
- headwater reaches included within Flat Top Key Moose Range

Sensitivity: Moderate

Management Considerations:

- adjacent land uses include forest harvesting and oil and gas activities
- access development for resource exploitation could impact on water quality and downstream water use

References:

- 1993 field reconnaissance

Site Name: **FLORIDA LAKE**

Site Location:

Two km northeast of Flat Top lookout
- Tp. 71 - Rg. 6 - W5

Description:

- small lake situated on the northeast slope of the Flat Top plateau
- surrounding upland vegetation primarily young fire-origin deciduous forest
- high diversity of lakeshore vegetation including deciduous and mixedwood forest, sedge meadow and willow shrubland
- mid-August, 1993 aerial reconnaissance observation included 10 ducks, great blue heron and several beaver lodges
- fisheries potential unknown but outlet creek likely Arctic grayling spawning habitat

Significance: Local

- important hydrological feature
- important moose habitat

Sensitivity: Moderate

Management Considerations:

- access development limited in surrounding area, except for Flat Top lookout road to the east and south of the lake

References:

- 1993 field reconnaissance

Site Name: LILY CREEK

Site Location:

East of Lesser Slave Lake Provincial Park with lower reach flowing through park
- Tp. 74-75 - Rg. 5-6 - W5

Description:

- relatively small creek with headwaters draining the southwest slopes of Marten Mountain
- upper reaches with narrow V-shaped valley while lower reaches flowing through Lesser Slave Lake Provincial Park become more meandering with a wider floodplain
- floodplain and valley slopes primarily forested - mixedwood and coniferous forest types
- fisheries potential unknown

Significance: Local

- significant hydrological feature
- important wildlife corridor
- old-growth riparian mixedwood and coniferous forest in adjacent uplands

Sensitivity: Moderate

Management Considerations:

- land use activities in adjacent areas minimal to date
- lower reaches flow through Lesser Slave Lake Provincial Park

References:

- Bradley (1980)
- 1993 field reconnaissance

Site Name: **MITSUE CREEK**

Site Location:

Northwest of Mitsue Lake
- Tp. 72 - Rg. 5 - W5

Description:

- primarily outlet of Mitsue Lake confluencing with Eating Creek and then draining into the Lesser Slave Lake River
- small, extensively meandering channel flowing in wide, shallow valley through adjacent organic terrain
- vegetation cover adjacent to channel primarily willow dominated shrubland and sedge fen; adjacent area primarily black spruce-tamarack
- northern pike spawning habitat

Significance: **Local**

- important hydrological feature
- primary outlet of Mitsue Lake
- northern pike spawning habitat

Sensitivity: Moderate

Management Considerations:

- extensive oil and gas access development in surrounding area may impact water quality and downstream water use

References:

- 1993 field reconnaissance
- Fish and Wildlife Services, unpublished

Site Name: **NARROWS CREEK**

Site Location:

Along north shore approximately 4 km west of the Narrows
- Tp. 75-76 - Rg. 8-10 - W5

Description:

- meandering creek draining a portion of the central north shore area
- meandering channel in a moderately wide floodplain with extensive beaver damning in upper reaches
- watershed consists of extensive muskeg areas and upland mixedwood forest
- several small lakes and extensive peatland areas serve as headwater sources
- northern pike occur in lower reaches

Significance: **Local**

- significant hydrological feature along north shore
- significant beaver and aquatic furbearer habitat
- watershed provides critical moose habitat
- old-growth mixedwood and coniferous forest

Sensitivity: Moderate

Management Considerations:

- extensive timber harvesting activities in upland mixedwood forest will impact on old-growth dependent wildlife species such as fisher, marten, red squirrel and numerous terrestrial songbirds

References:

- 1993 field reconnaissance
- Schultz and Bentz (1993)
- Fish and Wildlife Services, unpublished

Site Name: **NINE MILE POINT**

Site Location:

Near Wagner on south shore of Lesser Slave Lake
- Tp. 73 - Rg. 7 - Sec. 26 - W5

Description:

- small point of land created by depositional deltaic processes and wave action
- vegetation primarily sedge/grass with an area of dense willow in the central portion of the point
- extensive aquatic emergent vegetation around perimeter

Significance: **Local**

- significant local landform feature
- important waterfowl and shorebird staging and foraging area

Sensitivity: Moderate

Management Considerations:

- extensive cottage and residential development on adjacent upland area to the west and dredging of a channel for boat access will likely impact on waterfowl use of the area

References:

- 1993 field reconnaissance
- Ealey (1979)

Site Name: **PASTECHO RIVER**

Site Location:

North of Marten Creek
- Tp. 76 - Rg. 5 - W5

Description:

- headwaters reach of Pastecho River flowing north into the Wabasca River
- headwater originate in Marten Mountain
- meandering channel flowing through extensive peatland area
- floodplain vegetation primarily sedge meadow and riparian willow shrubland
- fisheries potential unknown

Significance: **Local**

- important hydrological feature
- provides beaver and aquatic furbearer habitat

Sensitivity: Moderate

Management Considerations:

- land use activities in adjacent areas minimal to date but will likely increase in the future

References:

- 1993 field reconnaissance

Site Name: **SALT CREEK**

Site Location:

Northeast of Buffalo Bay
- Tp. 76 - Rg. 12-14 - W5

Description:

- small meandering creek that drains northwestern portion of north shore empties into north portion of Buffalo Bay
- watershed mostly undisturbed and forested with a mixture of deciduous and mixedwood forest and small peatland area
- extensive beaver damming has created numerous ponds
- channel highly meandering with narrow floodplain and primarily sedge and willow communities

Significance: **Local**

- important hydrological feature of north shore
- significant beaver and aquatic furbearer habitat
- watershed provides significant moose habitat

Sensitivity: Moderate

Management Considerations:

- forest harvesting in southern portion of watershed to follow operating groundrules to minimize channel siltation and logging debris

Reference:

- 1993 field reconnaissance

Site Name: SHAW CREEK

Site Location:

Along north shore approximately 5 km west of Big Point
- Tp. 75-76 - Rg. 11-12 - W5

Description:

- small meandering creek draining a portion of western north shore area and emptying into Lesser Slave Lake west of Big Point
- meandering channel with narrow floodplain with extensive beaver damming in upper reaches
- several small lakes and large muskeg areas serve as headwater sources
- watershed area primarily forested with deciduous and mixedwood forest and extensive bog and fen complexes in the northern headwater areas

Significance: Local

- significant hydrological feature along north shore
- significant beaver and aquatic furbearer habitat
- watershed provides important moose habitat

Sensitivity: Moderate

Management Considerations:

- watershed largely unaffected by resource development to date

References:

- 1993 field reconnaissance
- Schultz and Bentz (1993)

Site Name: **SHAW CREEK PEATLANDS**

Site Location:

Headwater areas of Shaw Creek north of Big Point
- Tp. 76 - Rg. 10-11 - W5

Description:

- three large peatland areas located north of Big Point in the headwater areas of Shaw Creek
- variable peatland vegetation types including tamarack ribbed fens, sedge-dominated fens and black spruce-tamarack bogs
- two northern peatland areas constitute the southern portion of much larger, extensive peatland terrain to the north

Significance: **Local**

- important hydrological features that serve as discharge areas that drain southward into Lesser Slave Lake
- included within the North Shore Key Moose Range

Sensitivity: Moderate to High

Management Considerations:

- access development in area fairly limited to date

Reference:
- 1993 field reconnaissance

Site Name: **UNNAMED NORTH SHORE LAKES**

Site Location:

North of Lesser Slave Lake
- Tp. 75-76 - Rg. 6-13 - W5

Description:

- nine small (each less than 125 ha) unnamed lakes located north of Lesser Slave Lake within the study area
- lakes are generally shallow, usually with extensive aquatic emergent vegetation around perimeter and often with dense beds of yellow water lily (*Nuphar variegatum*) and pondweed (*Potamogeton spp.*)
- most lakes have at least one active beaver lodge and several broods of ducks; lake #9 had 100-150 ducks in mid-August, 1993

Significance: **Local**

- important hydrological features
- production and staging lakes for waterfowl
- important aquatic furbearer habitat

Sensitivity: Moderate

Management Considerations:

- increased levels of resource exploitation (timber harvesting) and access development may impact watercourses and water quality of lakes

References:

- 1993 field reconnaissance

Site Name: **UNNAMED LAKES - MARTEN MOUNTAIN**

Site Location:

Northeast of Marten Mountain
- Tp. 75 - Rg. 4 - W5

Description:

- three small unnamed lakes located in the upper elevation area of Marten Mountain
- lakes are generally shallow with minimal aquatic emergent vegetation around perimeter
- 1993 aerial reconnaissance (mid-August) resulted in observations of one brood of ducks, 4 loons and 4 kestrels
- adjacent vegetation cover of lake #'s 13 and 14 primarily black spruce-tamarack muskeg while lake # 15 has primarily upland mixedwood forest cover

Significance: **Local**

- important hydrological features; important headwater recharge areas for creeks draining Marten Mountain

Sensitivity: Moderate

Management Considerations:

- adjacent land use disturbance limited to date

References:

- 1993 field reconnaissance

Site Name: **UNNAMED LAKE**

Site Location:

Northeast of Muskeg Lake
- Tp. 73 - Rg. 5 - W5

Description:

- moderately-sized lake (approximately 200 ha) northeast of Muskeg Lake and 5 km east of Lesser Slave Lake
- located in extensive organic terrain south of Marten Mountain; surrounding vegetation black spruce-tamarack fen
- extensive emergent aquatic vegetation, primarily bulrush (*Scirpus* spp.) as well as extensive growth of yellow water lily (*Nuphar variegatum*)
- mid-August, 1993 aerial survey recorded in excess of 100 ducks (goldeneye, blue-winged teal)

Significance: **Local**

- significant hydrological feature
- important waterfowl production and staging waterbody
- important aquatic furbearer habitat
- outlet creek (Muskeg Creek) is a northern pike spawning area

Sensitivity: Moderate

Management Considerations:

- extensive oil and gas access development in surrounding area may affect local hydrology and water quality

References:

- 1993 field reconnaissance
- Fish and Wildlife Services, unpublished

Site Name: UNNAMED LAKES

Site Location:

Northeast of Mitsue Lake
- Tp. 72 - Rg. 4 - W5

Description:

- two small lakes located northeast of Mitsue Lake
- surrounding terrain primarily black spruce-tamarack fen
- extensive beds of yellow water lily (*Nuphar variegatum*)

Significance: Local

- important hydrological feature
- important aquatic furbearer habitat
- minor waterfowl production sites

Sensitivity: Moderate

Management Considerations:

- surrounding oil and gas wellsite and access development may impact on local hydrological regime

References:

- 1993 field reconnaissance

Site Name: **UNNAMED LAKE - FLAT TOP**

Site Location:

Approximately five km east of Florida Lake
- Tp. 71 - Rg. 5 - Sec. 15 - W5

Description:

- small unnamed lake east of Florida Lake in the Flat Top plateau area
- headwater source for a tributary of Eating Creek
- surrounding vegetation primarily upland mature mixedwood forest
- narrow fringe of aquatic emergent vegetation around lakeshore, primarily sedges
- three loons and one brood of four ducks recorded on the lake during 1993 aerial reconnaissance

Significance: **Local**

- important local hydrological feature
- important waterfowl habitat
- located within Flat Top Key Moose Range

Sensitivity: Moderate

Management Considerations:

- access development in surrounding area limited to date

References:

- 1993 field reconnaissance

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APPENDIX 1

SUMMARY OF COMMERCIAL FISHING HARVESTS FOR LESSER SLAVE LAKE OVER LAST FIVE YEARS

COMMERCIAL CATCH STATISTICS SUMMARY: LESSER SLAVE LAKE

AREA (ha): 119,659

YEAR AND DATE FISHED	SPECIES	QUOTA (Kg)	HARVEST (Kg)	Kg/ha	EFFORT (Kg/net)	MESH SIZE (NET LENGTH)	# OF FISHERMEN	TOTAL NETS	COMMENTS
East Basin 1992 May 6–June 8 (May 6–June 5)	Whitefish	190,500	205,000	1.71	25.59	nlt 127 mm (915 m)	18	8,010	East basin fishery, with closed zones: east end (E of Dog Is.) and 3 km area within Marten R. *orig. WE quota = 5000 Kg; extra 5000 given to attain LW quota. Most WE caught in 17–25 ft, from Narrows to Big Stoney Pt, between May 22–June 1. WE arrived in E basin approx 2 wks earlier than usual. Enf. recommend boundary change from Assineau R to Big Stoney Pt. Bad weather, high winds resulted in 15 % culls in LW and NP.
	Pike	50,000	21,628	0.18	2.70				
	Walleye	* 10,000	7,500	0.06	0.94				
	Tullibee	50,000	0	0.00	0.00				
		300,500	234,128	1.96	29.23				
West Basin 1992 DOIB–May 5 (Apr 10–May 5)	Whitefish	50,000	48,516	0.41	17.64	102 mm (915 m)	12	2,750	West basin NP fishery – south shore open from Mission Cr to Narrows, withi 300 m of shore and less than 3 m depth Perch caught on rock bar in Faust Bay.
	Pike	50,000	41,557	0.35	15.11				
	Walleye	5,000	1,000	0.01	0.36				
	Tullibee	50,000	0	0.00	0.00				
	Perch	0	4,125	0.03	1.50				
		155,000	95,198	0.80	34.62				
West Basin 1992 Oct 1–7 (Oct 1–3)	Whitefish	70,000	72,236	0.60	95.80	nlt 127 mm (915 m)	21	754	West basin LW fall fishery; open zone: 3 bays (Sucker Cr, Joussard, Faust) in less than 4.5 m depth.
	Pike	5,000	529	0.00	0.70				
	Walleye	5,000	1,323	0.01	1.75				
	Tullibee	5,000	0	0.00	0.00				
		85,000	74,088	0.62	98.26				
West Basin 1992 Dec 7–9	Whitefish	200,000	72,122	0.60	51.15	nlt 127 mm (915 m)	45	1,410	West basin fishery, west end closed (Mission Cr to Cutbank Pt). Cutter reduction agreement (max 63000 Kg headless dressed LW). Ice depth: 4 – 12"
	Pike	5,000	4,647	0.04	3.30				
	Walleye	5,000	7,245	0.06	5.14				
	Tullibee	10,000	0	0.00	0.00				
		220,000	84,014	0.70	59.58				
1992/93 TOTALS	Whitefish	500,000	397,874	3.33					
	Pike	100,000	68,361	0.57					
	Walleye	35,000	17,068	0.14					
	Tullibee		0	0.00					
	Perch		4,125	0.03					
			487,428	4.07					

CATCH STATISTICS LESSER SLAVE LAKE

YEAR AND DATE FISHED	QUOTA (kg)	SPECIES	kg-FISH	kg/ha	FISHING EFFORT (kg/net)	NET LENGTH(m) MESH SIZE (mm)	# FISHERME (NO. NETS ENTIRE FI
1991	50,000 LW	Whitefish	12,083	0.10	10.07	915 m	17 (1,200)
DOIB-May 5	50,000 NP	Pike	44,780	0.37	37.32	102 mm	
(Apr. 22-May 4)	50,000 TU	Perch	883	0.01	0.74		
	5,000 WE		57,746	0.39	48.13		
West basin, pike ring fishery.							
1991	240,000 LW	Whitefish	238,125	1.99	-	915 m	17 (NA)
May 6-June 8	50,000 TU	Pike	12,824	0.11	-	nlt 127 mm	
(May 6-June 2)	50,000 NP	Walleye	2,453	0.02	-		
	5,000 WE		253,402	2.12			
East basin fishery. Problems occurred initially with ice movements and later with strong winds.							
1991	189,000 LW	Whitefish	176,000	1.47	46.52	915 m	43 (3,783
Dec. 9-13	34,000 NP	Pike	29,569	0.25	0.25	nlt 127 mm	
(Dec. 9-19)	23,000 WE	Walleye	10,472	0.09	0.09		
	10,000 TU		216,041	1.81	46.86		
West basin fishery. Most nets pulled every other day.							
1992	13,000 LW	Whitefish	18,447	0.15	50.68	915 m	26 (364)
Jan. 9-10	12,000 WE	Pike	791	0.01	2.17	nlt 127 mm	
	5,000 NP	Walleye	601	0.01	1.65		
			19,839	0.17	54.50		
West basin fishery. A one pull fishery to take remaining quota from Dec./91 fishery.							
* 1991/92	520,000 LW	Whitefish	543,719	4.54			
TOTALS	35,000 WE	Pike	96,270	0.80			
	100,000 NP	Walleye	15,965	0.13			
		Perch	883	0.01			
			656,837	5.48			

CATCH STATISTICS - LESSER SLAVE LAKE

YEAR AND DATE FISHED	QUOTA (kg)	SPECIES	kg-FISH	kg/ha	FISHING EFFORT (kg/net)	NET LENGTH(m) MESH SIZE (mm)	# FISHERMEN (NO. NETS F ENTIRE FIS
1990 Sept 26-Oct 10 (Sept 26-27, Oct 4-10)	52,000 LW 5,000 NP 5,000 WE	Whitefish Pike	55,922 1,644 57,566	0.47 0.01 0.48	63.91 1.88 65.79	915 m nlt 140 mm	14 (875)
Roe fishery, west basin; zoning and depth restriction (nmt 2 m). Fishery closed initially and re-opened October 4 when roe was good. Roe harvest was 2,543 kg ($5.32/kg).							
1990 Dec 5-10 (Dec 5-9)	95,000 LW 15,000 NP 12,000 WE	Whitefish Pike Walleye	100,723 22,365 2,795 125,883	0.84 0.19 0.02 1.05	41.97 9.32 1.16 52.45	915 m nlt 127 mm	42 (2,400)
West basin fishery. Closed on whitefish and pike quotas.							
1990 Dec 13-19 (Dec 13-16)	80,000 LW 15,000 NP 12,000 WE	Whitefish Pike Walleye	85,438 9,154 3,298 97,890	0.71 0.08 0.03 0.82	51.78 5.55 2.00 59.33	915 m nlt 127 mm	44 (1,650)
West basin fishery. Closed on whitefish quota.							
1991 Jan 18-30 (Jan 18-23)	70,000 LW 13,000 NP 28,000 WE	Whitefish Pike Walleye	82,201 6,458 2,091 90,750	0.69 0.05 0.02 0.76	25.41 2.00 0.65 28.06	915 m nlt 127 mm	33 (3,235)
West basin fishery. Closed on whitefish quota.							
1990/91 **TOTALS**	520,000 LW * 45,000 WE 100,000 NP	Whitefish Walleye Pike	529,967 9,256 73,832 613,055	4.43 0.08 0.62 5.13	*20,000 Kg extra LW to W. basin due to a market request.		
1991 April 2-7	94,000 LW 10,000 TU 10,000 NP 5,000 WE	Whitefish Pike Walleye	99,064 8,306 2,439 109,809	0.83 0.07 0.02 0.92	23.64 1.98 0.58 26.20	915 m nlt 127 mm	38 (4,19
West basin fishery. Closed on whitefish quota, on closing date.							

CATCH STATISTICS - LESSER SLAVE LAKE

YEAR AND DATE FISHED	QUOTA (kg)	SPECIES	kg-FISH	kg/ha	FISHING EFFORT (kg/net)	NET LENGTH(m) MESH SIZE (mm)	# FISHERMEN (NO. NETS FOR ENTIRE FISHE
1989 Dec. 1-15 (Dec. 1-5)	95,000 whitefish or 73,500 pike or 30,000 walleye or 50,000 tullibee	Whitefish Pike Walleye	131,257 17,538 4,763 153,558	1.10 0.15 0.04 1.29	38.25 5.11 1.39 44.75	915 m nlt 127 mm	66 (3,432
West basin fishery, with zoning. Closed on whitefish quota (exceeded by 36,250 kg).							
*1989/90 TOTALS	500,000 LW 45,000 WE 100,000 NP	Whitefish Walleye Pike Perch	403,867 9,717 43,938 759 458,281	3.38 0.08 0.37 0.01 3.84			
1990 May 6-June 15 (May 6-June 8)	200,000 LW 5,000 WE 50,000 NP 50,000 TU	Whitefish Walleye Pike	198,244 1,000 17,637 216,881	1.66 0.01 0.15 1.82	20.02 0.10 1.78 21.90	915 m nlt 127 mm	20 (9,900)
East basin fishery with zoning. Closed on whitefish quota. Problems with fishermen in closed zone west of narrows (zoning boundary problem); catching small walleye in narrows area.							
1990 April 20-May 5	50,000 LW 50,000 NP 50,000 TU 5,000 WE	Whitefish Pike Walleye	7,439 16,574 72 24,085	0.06 0.14 < 0.01 0.20	11.81 26.31 0.11 38.23	915 m nlt 127 mm	10 (630)
West basin fishery,with zoning (ring fishery). Problems with poor ice at beginning of fishery, and generally bad weather conditions.							

CATCH STATISTICS - Lesser Slave LAKE

YEAR AND DATE FISHED	QUOTA (kg)	SPECIES	kg-FISH	kg/ha	FISHING EFFORT (kg/net)	NET LENGTH(m) MESH SIZE (mm)	# FISHERMEN (NO. NETS FOR ENTIRE FISHER
1988 Dec. 1-19 (Dec.1-6)	142,500 LW or 14,000 WE or 40,000 NP or 50,000 TU	Whitefish Walleye Pike	189,873 14,048 23,382	1.59 0.12 0.20	37.11 2.75 4.57	915 m (nlt 127 mm)	90 (5,117)
			227,303	1.91	44.43		
	West basin fishery with closed zones. Fishery closed on whitefish and walleye quotas. Poor ice conditions caused some travel problems on the lake.						
1988/89 **TOTAL**	500,000 LW or 45,000 WE or 100,000 NP or 100,000 TU	Whitefish Walleye Pike Tullibee Ling Suckers	435,603 44,899 77,754 484 91 165	3.64 0.38 0.65 < 0.01 < 0.01 < 0.01			
			558,996	4.67			
1989 April 20-May 15	100,000 LW or 1,000 WE or 100,000 NP or 50,000 TU	Whitefish Walleye Perch Pike	42,410 1,102 759 14,681	0.35 0.01 0.01 0.12	17.14 0.45 0.31 5.93	915 m (nlt 127mm)	13(2,475)
			58,952	0.49	23.83		
	West basin fishery; extended from May 5 to May 15. Walleye quota taken by closing date.						
1989 May 6-20 (May 15 - June 15)	200,000 LW or 5,000 WE or 100,000 NP or 50,000 TU	Whitefish Walleye Pike	182,351 2,809 10,585	1.52 0.02 0.09	27.11 0.42 1.57	915 m (nlt 127mm)	?(6,727)
			195,745	1.63	29.10		
—	East basin fishery; extended from May 20 to June 15. Whitefish catches were good; the walleye quota was increased from 500 to 5,000 kg to continue the fishery. Fishery closed on extended closing date.						
1989 Sept. 26-Oct.10 (Sept.26-Oct.3)	52,000 LW or15,000 WE or 74,700 NP or50,000 TU	Whitefish Walleye Pike	47,849 1,043 1,134	0.40 0.01 0.01	31.94 0.70 0.76	915 m nlt 127 mm	24 (1,498)
			50,026	0.42	33.40		

West basin roe fishery with three bays open along south shore. Closed on whitefish quota.

APPENDIX 2

SIGNIFICANT ECOLOGICAL FEATURE DATABASE

LESSER SLAVE LAKE SEF INVENTORY

SITE NO.	MUNI CODE	SITE NAME	TWP	RG	MER	SEC	LEG. SUB	NTS MAP
1	5017	ATHABASCA RIVER	70	1	5	0	0	83O01
2	5017	CHISHOLM RIBBED FEN	70	2	5	0	0	83O01
3	5017	HONDO NATURAL AREA	70	1	5	31	0	83O01
4	5017	LESSER SL LAKE HORIZONTAL FEN	73	4	5	0	0	83O07
5	5017	LESSER SL LAKE NORTH SHORE	76	10	5	0	0	83O11
6	5017	LESSER SL RIVER WEST REACH	73	5	5	0	0	83O07
7	5017	LESSER SL RIVER EAST REACH	72	2	5	0	0	83O01
8	5017	MARTEN MOUNTAIN	75	5	5	0	0	83O07
9	5017	MITSUE CARIBOU RANGE	71	2	5	0	0	83O01
10	5017	NORTH SHORE MOOSE AREA	75	9	5	0	0	83O11
11	5017	OTAUWAU NATURAL AREA	71	3	5	26	0	83O01
12	5017	POLICE POINT NATURAL AREA	76	14	5	6	0	83N09
13	5017	SAULTEAUX NATURAL AREA	71	2	0	14	0	83O01
14	5017	FLAT TOP MOOSE AREA	71	4	0	0	0	83O02
15	5017	LESSER SL LAKE SE SHORELINE	73	6	5	0	0	83O07
15	5017	LILY LAKE	73	5	5	0	0	83O07
17	5017	MARTEN CREEK	75	5	5	0	0	83O10
18	5017	MARTEN LAKES	76	4	5	0	0	83O10
19	5017	MITSUE LAKE	72	4	5	0	0	83O02
20	5017	MITSUE LAKE NATURAL AREA RESER.	72	5	5	14	0	83O02
21	5017	MOONEY CREEK	72	6	5	0	0	83O07
22	5017	MUSKEG CREEK	74	5	5	0	0	83O07
23	5017	MUSKEG LAKE	73	5	5	15	0	83O07
24	5017	NARROWS CREEK PEATLANDS	75	10	5	0	0	83O11
25	5017	NORTH NARROWS CR OLD GROWTH	76	9	5	0	0	83O11
26	5017	OTAUWAU RIVER	72	3	5	0	0	83O01
27	5017	OTAUWAU RIVER NAT. AREA RESERV.	72	3	5	3	0	83O01
28	5017	SAULTEAUX RIVER	71	2	5	0	0	83O01
29	5017	SAWRIDGE CREEK	72	6	5	0	0	83O02
30	5017	SE BEACH RIDGE PEATLANDS COMPL	73	5	5	0	0	83O07
31	5017	OILMAN'S CREEK	75	6	5	0	0	83O10
32	5017	SAULTEAUX LAKE COMPLEX	71	2	5	0	0	83O01
33	5017	WILLOW RIVER	76	4	5	0	0	83O10
34	5017	WILLOW POINT-ASSINEAU RIVER	74	8	5	0	0	83O06
35	5017	CABIN CREEK	75	6	5	0	0	83O10
36	5017	EATING CREEK	72	5	5	0	0	83O02
37	5017	FLORIDA CREEK	71	5	5	0	0	83O02
38	5017	FLORIDA LAKE	71	6	5	0	0	83O02
39	5017	LILY CREEK	74	5	5	0	0	83O07
40	5017	MITSUE CREEK	72	5	5	0	0	83O07
41	5017	NARROWS CREEK	75	10	5	0	0	83O11
42	5017	NINE MILE POINT	73	7	5	0	0	83O07
43	5017	PASTECHO RIVER	76	5	5	0	0	83O10
44	5017	SALT CREEK	76	13	5	0	0	83O10
45	5017	SHAW CREEK	75	11	5	0	0	84O12
46	5017	SHAW CREEK PEATLANDS	76	11	5	0	0	83O12
47	5017	UNNAMED LAKES-NORTH SHORE	76	10	5	0	0	83O12
48	5017	UNNAMED LAKES-MARTEN MTN	75	4	5	0	0	83O10

LESSER SLAVE LAKE SEF INVENTORY

SITE NO.	MUNI CODE	SITE NAME	TWP	RG	MER	SEC	LEG. SUB	NTS MAP
49	5017	UNNAMED LAKE	73	5	5	0	0	83O07
50	5017	UNNAMED LAKES	72	4	5	0	0	83O07
51	5017	UNNAMED LAKE-FLAT TOP	71	5	5	15	0	83O02

LESSER SLAVE LAKE SEF INVENTORY

SITE NO.	THEME	CRITERIA	SIGNIF	SEN1	SEN2	SEN3	SEN4	SEN5	SEN6	SEN7	SEN8	SEN9	SE10	FEATURES
1	3	3	2	L	L	M	M	M	M	M	M	M	H	PROVINCIAL WATERCOURSE
2	2	3	3	L	L	H	H	M	M	M	M	H	H	SIGNIFICANT PEATLAND
3	7	11	3	L	L	M	H	H	H	H	M	H	H	DESIGNATED EDUCATIONAL NATURAL AREA
4	5	5	3	M	L	M	M	L	M	M	M	H	M	WILDLIFE AND FISHERIES HABITAT
5	5	5	3	M	L	M	M	L	M	M	M	H	M	WILDLIFE AND FISHERIES HABITAT
6	3	2	3	L	L	M	M	M	M	M	M	M	M	FISHERIES AND WILDLIFE HABITAT
7	3	2	3	L	L	M	M	M	M	M	M	M	M	FISHERIES AND WILDLIFE HABITAT
8	1	5	3	I	I	M	M	M	M	L	M	H	M	SIGNIFICANT LANDFORM, VEGETATION
9	5	4	3	M	M	H	H	M	H	H	H	H	H	WOODLAND CARIBOU RANGE
10	5	7	3	M	L	M	H	M	M	M	M	M	H	KEY MOOSE RANGE, VEGETATION DIVERSITY
11	7	11	3	L	L	M	H	H	H	H	M	H	H	DESIGNATED EDUCATIONAL NATURAL AREA
12	7	11	3	L	L	M	H	H	H	H	M	H	H	DESIGNATED NATURAL AREA
13	7	11	3	L	L	M	H	H	H	H	M	H	H	DESIGNATED EDUCATIONAL NATURAL AREA
14	5	7	4	M	L	M	H	M	M	M	M	M	H	KEY MOOSE RANGE
15	5	5	4	M	L	M	M	L	M	M	M	H	H	WILDLIFE AND FISHERIES HABITAT
15	3	2	4	L	L	M	M	M	M	M	M	M	L	FISHERIES HABITAT, RECREATION
17	3	2	4	L	L	M	M	M	M	M	M	M	H	FISHERIES HABITAT, LANDFORM DIVERSITY
18	3	2	4	L	L	M	M	M	M	M	M	M	L	FISHERIES HABITAT, RECREATION
19	3	2	4	L	L	M	M	M	M	M	M	M	L	FISHERIES AND WILDLIFE HABITAT
20	7	11	4	L	L	M	H	H	H	H	M	H	H	NATURAL AREA RESERVATION
21	3	2	4	L	L	M	M	M	M	M	M	M	H	HYDROLOGY, FISHERIES
22	3	2	4	L	L	M	M	M	M	M	M	M	H	HYDROLOGY, FISHERIES
23	3	2	4	L	L	M	M	M	M	M	M	M	L	HYDROLOGY, WATERFOWL HABITAT
24	2	2	4	L	L	H	H	M	M	M	M	H	H	HYDROLOGY, VEGETATION DIVERSITY
25	4	5	4	L	L	H	H	H	H	H	H	H	H	OLD GROWTH FOREST, WILDLIFE HABITAT
26	3	2	4	L	L	M	M	M	M	M	M	M	H	HYDROLOGY, FISHERIES AND WILDLIFE HAB.
27	7	11	4	L	L	M	H	H	H	H	M	H	H	NATURAL AREA RESERVATION
28	3	2	4	L	L	M	M	M	M	M	M	M	H	HYDROLOGY, FISHERIES AND WILDLIFE HAB.
29	3	2	4	L	L	M	M	M	M	M	M	M	H	HYDROLOGY, FISHERIES HABITAT
30	2	2	4	L	L	H	H	M	M	M	M	H	H	LANDFORM AND VEG. DIVERSITY WILDLIFE
31	3	2	4	L	L	M	M	M	M	M	M	M	H	HYDROLOGY, FISHERIES
32	3	2	4	L	L	M	M	M	M	M	M	M	L	HYDROLOGY, WILDLIFE HABITAT
33	3	2	4	L	L	M	M	M	M	M	M	M	H	HYDROLOGY, FISHERIES HABITAT
34	5	5	5	M	L	M	M	L	M	M	M	H	H	LANDFORM, WATERFOWL HABITAT
35	3	2	5	L	L	M	M	M	M	M	M	M	H	HYDROLOGY, LANDFORM FEATURE, WILDLIFE
36	3	2	5	L	L	M	M	M	M	M	M	M	H	HYDROLOGY

LESSER SLAVE LAKE SEF INVENTORY

SITE NO.	THEME	CRITERIA	SIGNIF	SEN1	SEN2	SEN3	SEN4	SEN5	SEN6	SEN7	SEN8	SEN9	SE10	FEATURES
37	3	2	5	L	L	M	M	M	M	M	M	M	H	HYDROLOGY
38	3	2	5	L	L	M	M	M	M	M	M	M	L	HYDROLOGY
39	3	2	5	L	L	M	M	M	M	M	M	M	H	HYDROLOGY
40	3	2	5	L	L	M	M	M	M	M	M	M	H	HYDROLOGY, FISHERIES HABITAT
41	3	2	5	L	L	M	M	M	M	M	M	M	H	HYDROLOGY, WILDLIFE HABITAT
42	1	3	5	L	L	H	H	M	M	M	M	H	H	LANDFORM FEATURE, WATERFOWL HABITAT
43	3	2	5	L	L	M	M	M	M	M	M	M	H	HYDROLOGY
44	3	2	5	L	L	M	M	M	M	M	M	M	H	HYDROLOGY, WILDLIFE HABITAT
45	3	2	5	L	L	M	M	M	M	M	M	M	H	HYDROLOGY
46	2	2	5	L	L	H	H	M	M	M	M	H	H	LANDFORM FEATURE, VEGETATION DIVERSITY
47	3	2	5	L	L	M	M	M	M	M	M	M	L	HYDROLOGY, WILDLIFE HABITAT
48	3	2	5	L	L	M	M	M	M	M	M	M	L	HYDROLOGY
49	3	2	5	L	L	M	M	M	M	M	M	M	L	HYDROLOGY, WATERFOWL HABITAT
50	3	2	5	L	L	M	M	M	M	M	M	M	L	HYDROLOGY
51	3	2	5	L	L	M	M	M	M	M	M	M	L	HYDROLOGY